

HITCHCOCK'S Machine tool BLUE BOOK

FOUNDED

MARCH 1940

1905

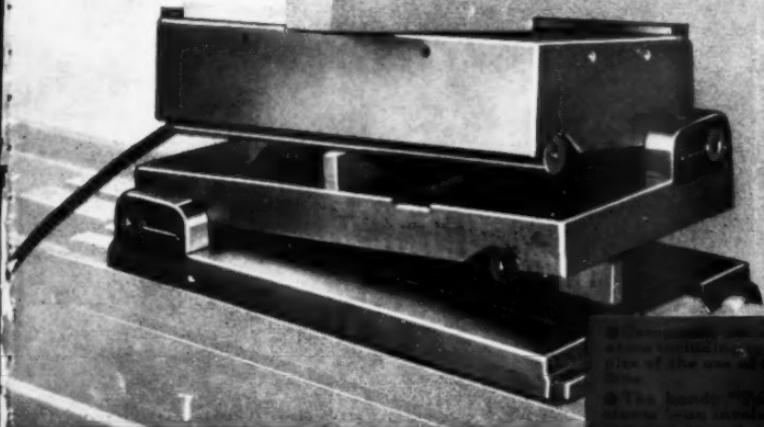
*If You Do An Average Volume
OF ANGULAR GRINDING or CHECKING*

... a Magna-Sine in your plant will more than pay for itself in a few weeks. You can reduce the time required for your angular set-ups—either single or compound—from hours to minutes. Once the angle is determined, it is only necessary to snap the switch and your work is held securely in position. No clamps, straps or other fastening equipment are required.

The Magna-Sine is built to the closest preci-

sion limits. When used for angular grinding or as inspection equipment, accuracy is assured to the exact limits of the standard gage blocks which are used.

The Magna-Sine, with the magnetic sine table, is available in three sizes in both compound and single angle models. A non-magnetic Sine Plate, used only for inspection work, is also furnished in three sizes and in both styles.



Be
Sure
To
Write
For



Information including a good example of the use of the Magna-Sine.

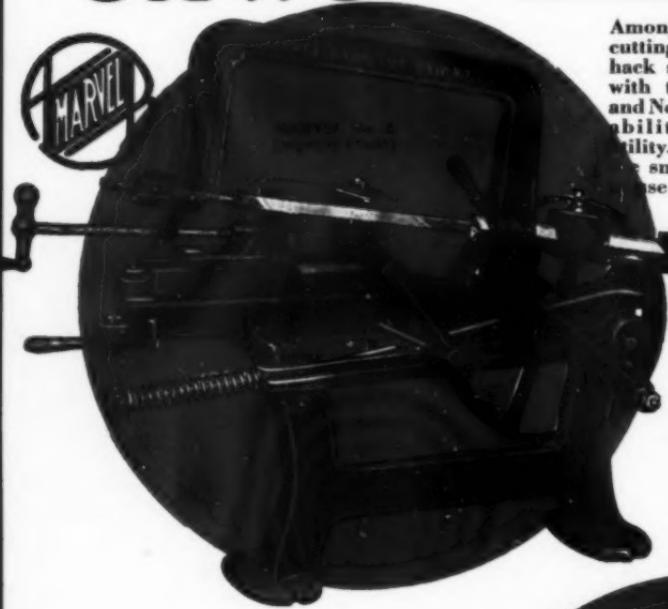
• The handy Magna-Sine Gage Block is an invaluable aid in accurate angular setting.

The MAGNA-SINE

ROBBINS ENGINEERING CO.
639 Mt. Elliott Ave. • Detroit, Mich.

MARVEL SAWS

CUT FAST, SAW STRAIGHT,
SAVE BLADES



Among low priced dry cutting, general purpose hack saws, none compare with the MARVEL No. and No. 2 for utmost dependability and all around utility. That is why 80% of small dry cutting saws made are MARVELS.



CHECK OVER THESE FEATURES

Heavier, sturdier construction with (1) Heavy Rigid Frame, (2) V-Bearing with Screw Take-up, (3) Adjustable Blade Tension, (4) Swivel Vise, (5) Automatic Stop, (6) Feed Pressure Adjustment, (7) All-Front Control, (8) Adjustable Stroke, (9) Stationary or Portable Belt or Motor Driven Models, (10) Low Price.

Belt Driven:

No. 1 Capacity 4¹/₂" x 4¹/₂" \$46.00

No. 2 Capacity 8¹/₂" x 8¹/₂" 79.00

also available in Motor Driven Types and Portable Models.

BUY FROM YOUR LOCAL DISTRIBUTORS

MARVEL DIVISION OF THE DULUTH MFG. CO., "The Hack Saw People" CHICAGO
BIRMINGHAM - NEW YORK - PORTLAND - SAN FRANCISCO
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IN WELDING in years** Finger Tip

Control at the Work Speeds Production... Improve
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With the Hobart Remote Control at his finger tips the operator can control his work with 100 fine adjustments. Not only does this save time and money, but removes the temptation to "get by" with improper arc adjustments. Hobart's new "Multi-Range Dual Control" is another Hobart feature that makes better quality welding possible. These 2 exclusive Hobart advantages save time and cut costs.

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Send full information about the new Hobart self-
sewing Arc Welder, particularly on the items
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I'm interested in _____ Amp. capacity.

To be used for _____
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 30 Days Trial Renting with purchase privilege

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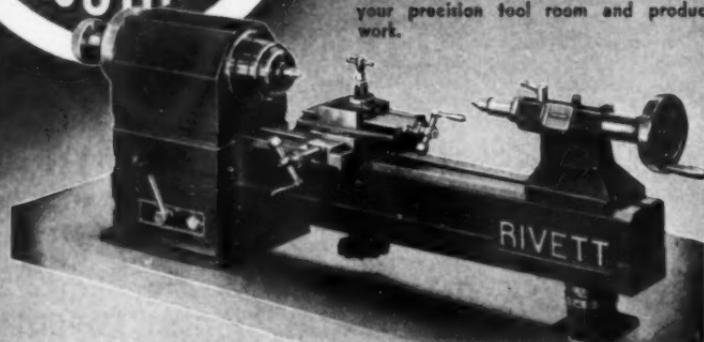
HOBART

MORE
PRECISION
WORK

Companions

918 BENCH LATHE

Bulletin 918 presents Rivett high precision, heavy duty bench lathe and hand screw machine. The balanced design, vibrationless performance, high spindle speeds and operating features place these machines in front for your precision tool room and production work.



918 HAND SCREW MACHINE

As with the bench lathe the hand screw machine has all-electric V-belt drive, speeds to 3750 r.p.m., 9" swing ball bearing spindle with long taper key-drive nose and draw-in or push-out type 1" capacity collets. For first operation bar work with or without automatic stock feed. For second operations, spring-temper collets and step chucks. Ball bearing, rotary chuck closer. Oil pump optional.

SEND FOR BULLETIN 918

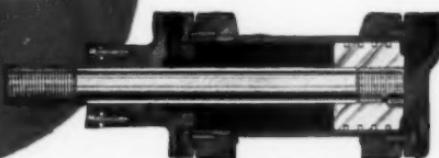


RIVETT LATHE & GRINDER INC.
PIONEERS IN BENCH LATHE DEVELOPMENT

BRIGHTON, BOSTON, MASS.

STRONGER AND SIMPLER HYDRAULIC CYLINDERS

mean Better Hydraulic Power



Sectional View

The patented no-tie-rod design of Hannifin Hydraulic Cylinders provides a stronger cylinder assembly, simpler to use, assuring high efficiency operation. End caps may be positioned independently to bring inlet port at top, bottom, or either side. They may be moved without collapse of other parts, and without disturbing the cylinder mounting. Air vent plugs on three sides of each cap allow for a vent at the top with inlet at either side or bottom. Special mirror finish honing

gives a cylinder bore that is straight, round, perfectly smooth. Perfect piston seal with minimum fluid slip is assured.

Six standard mountings simplify application to a wide range of uses. Available with small diameter piston rod, 2 to 1 differential piston rod, or double end piston rod, in all sizes, for working pressures up to 1000 and 1500 lbs. sq. in. Other types built to order.

Write for Bulletin 35-H with complete specifications.

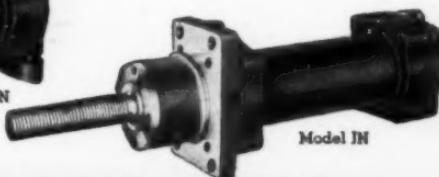
HANNIFIN MANUFACTURING COMPANY

621-631 South Kolmar Avenue • Chicago, Illinois

Engineers • Designers • Manufacturers • Pneumatic and Hydraulic Production Tool Equipment



Model CN



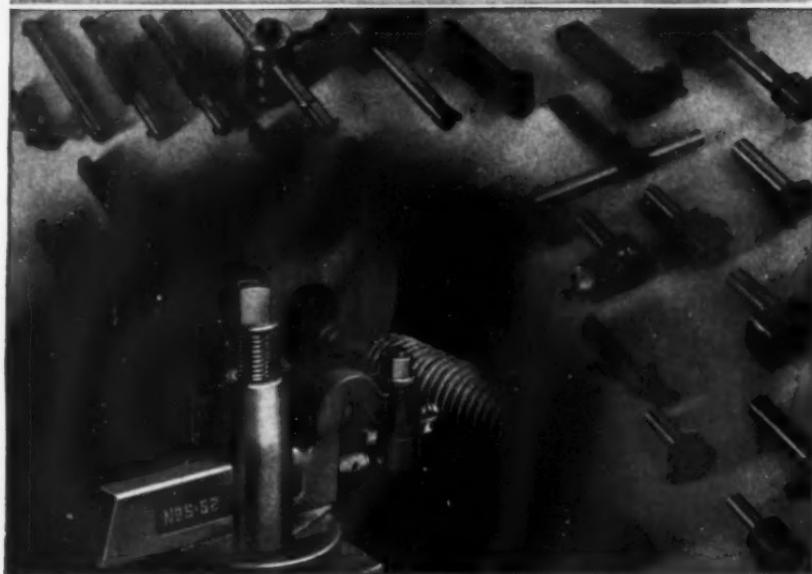
Model JN

Many other mountings available

HANNIFIN

HYDRAULIC CYLINDERS

ARMSTRONG



End Tool Room Jams with the right ARMSTRONG TOOL HOLDERS

Every step-up in production, every change in models, every "new" product starts in the tool room with new tools, dies, jigs and fixtures. Too often when there is greatest urgency of speed the entire plant waits on the tool room. Yet these periodic and costly jams in the tool room are not entirely unavoidable, for with the correct ARMSTRONG TOOL HOLDERS you can step up speeds and feeds on all lathes, planers, slotters, and shapers at will.

Each ARMSTRONG TOOL HOLDER has sufficient strength and rigidity to stand up to any cut the machine tool can pull—to speeds and feeds far beyond those customarily used.

The Armstrong System provides ARMSTRONG TOOL HOLDERS in over 100 sizes and shapes. Each is a permanent, multi-purpose tool that takes cutters quickly ground from stock shapes of high speed steel. Each is designed to give the most efficient cutting angle, the most convenient tool approach and the greatest tool clearance and excessive strength. With the correct ARMSTRONG TOOL HOLDER for each operation you are permanently toolled-up, ready to start work immediately at top speed with the most efficient tools available.

Build your Armstrong System and end costly jams in the tool room.

ARMSTRONG BROS. TOOL CO.

"THE TOOL HOLDER PEOPLE"

308 N. FRANCISCO AVE.,

CHICAGO, U. S. A.

Eastern Warehouse and Sales: 199 Lafayette St., New York



ARMSTRONG TOOL HOLDERS Are Used in Over 90% of the Machine Shops and Tool Rooms



HITCHCOCK'S MACHINE TOOL BLUE BOOK

29,200 THIS ISSUE

MARCH 1940

VOLUME 35, No. 3

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Application for entry at Chicago, Ill. Pending under Sec. 574½ P. L. & R.



ONLY FIVE
TO SEVEN
MINUTES FOR
A COMPLETE
COLLET SIZE
CHANGE-OVER



Exceptional Savings

When Used On **LARGE SIZE MACHINES**

The Martin Master Collet has been adopted as standard by three of the country's leading machine tool builders! On their larger machines in particular they have seen conclusive evidence that this collet does reduce change-over time to a minimum and is thoroughly trouble-free in its patented construction.

What they get—and what you will get when Martin Master Collets are used on your machines are these features:

CONSTRUCTION PERMITS QUICK CHANGE OF COLLET SIZES — The Martin Master Collet is so designed that interchangeable pads are removed from the end of the collet. The collet itself *remains in operating position in the machine*. A complete collet size change-over can be made in from five to seven minutes. This time-saving feature becomes especially advantageous when the collet is used on large machines.

NO LOOSENING OF PADS — The pads are integral parts of the locking wedges which fit tightly into the end of the collet. They will *positively not become loose*. When it is necessary to change the pads, a few turns of the wedge screws permit quick removal.

REMARKABLE PRODUCTION SAVINGS — The initial cost of the Martin Master Collet is not high. Size changes are made only by the use of removable pads, which are considerably lower in cost than any complete collet replacement. You're assured of savings in time, in collet costs and in equipment usually required for making size changes.

WRITE FOR COMPLETE INFORMATION ON THE MARTIN MASTER COLLET OR ON ALL OTHER "MODERN" SCREW MACHINE REPLACEMENT PARTS AND TOOLS.

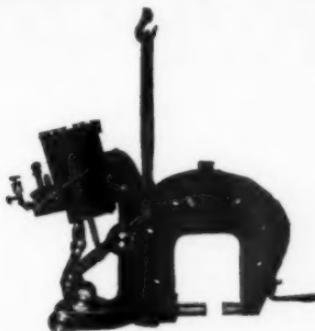
MODERN COLLET and MACHINE CO.

403 Salliotte Street,



Ecorse, Michigan

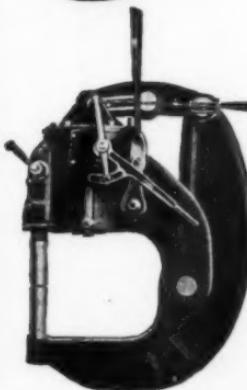
HANNA SQUEEZE RIVETERS



Small, light weight Squeezers or large, deep gap Stationary Machines. The line of Hanna Squeeze Riveters includes them all.



No previous riveting experience necessary as a Hanna Riveter sets each rivet with ONE stroke of the piston and with a predetermined pressure.



17—1" rivets per minute are easily set with the Shepard Pinch Bug Riveter illustrated. Rivets are inserted from above and headed from below. Compactness and light weight make it especially popular as a portable Squeezer.

HANNA ENGINEERING WORKS
1763 Elston Ave., Chicago, Ill.

Motor-Avey

Drilling AND Tapping Machines

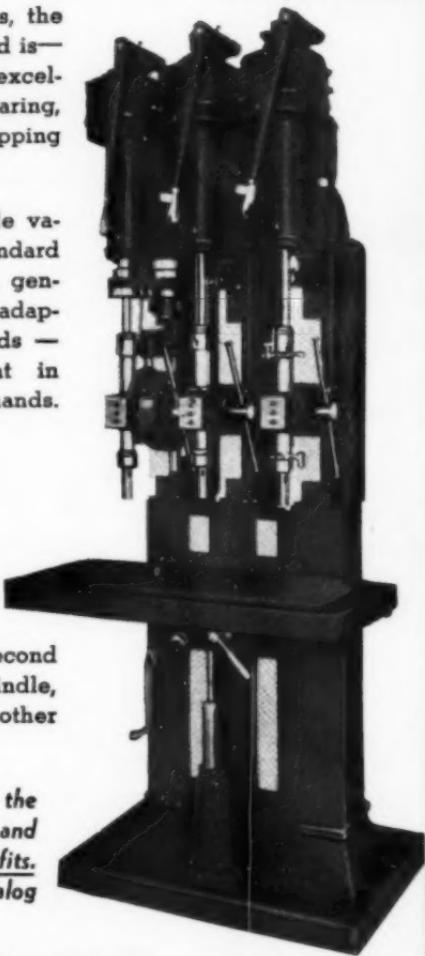
For more than three decades, the name "AVEY" has been—and is—regarded as the standard of excellence in the making of ball bearing, sensitive drilling and tapping equipment.

Avey products include a wide variety of types and sizes in standard single and multiple spindle, general purpose machines—also adaptations to specialized needs—meeting every requirement in today's high production demands.

TYPE MA-6 Six Speeds

The unit shown is the six-speed No. 2 Combination Machine Type MA-6. First spindle is Avey-matic; second spindle, hand feed; third spindle, tapping. Can be supplied in other combinations as required.

Let AVEY Equipment show you the way to new economies in drilling and tapping—new production profits. Send TODAY for AVEY Catalog No. 39.



The AVEY DRILLING MACHINE CO., Cincinnati, O.



To remove scale . . . to
get a smooth finish on
bronze elevator doors
BALDWIN BRASS WORKS USE

SKILSAW *Zephyrplane* THE MODERN 3 IN. BELT SANDER



HERE ARE ITS OUTSTANDING FEATURES

- Patented lever makes belt changing quick and easy.
- Knob handle can be moved from top to the nose of sander for greater convenience when sanding vertical surfaces.
- Perfectly balanced for even pressure on entire sanding surface.
- Lighter, easier to handle, weighs only 13½ lbs.

Ordinary sanders tear metal . . . hand sanding is too slow—so Baldwin Brass Works of Chicago chose the SKILSAW ZEPHYRPLANE to make their finishing operations quick and profitable. Working at a special belt speed of 750 R.P.M., ZEPHYRPLANE now removes the scale and puts a satin-smooth surface on the high grade bronze elevator doors that this company make.

ZEPHYRPLANE saves time and money wherever finishing is done on metals, wood or compositions. Special belt speeds for aluminum, bronze, copper and stainless steel surfaces. Plugs into any light socket.

SKILSAW, INC., 5035 Elston Avenue, Chicago

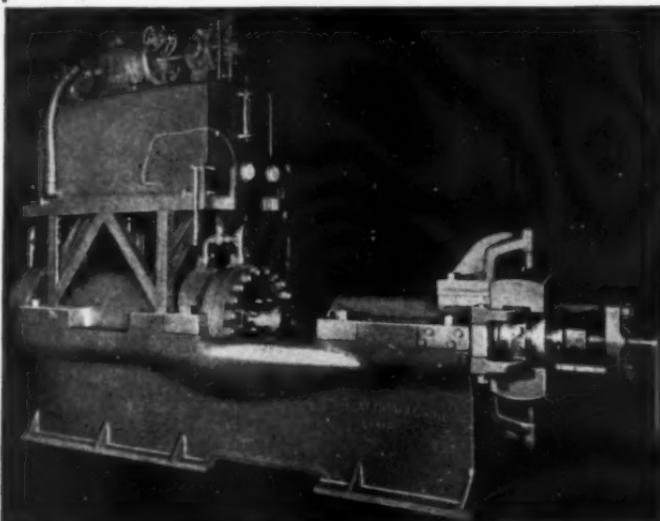
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save you money

No.100 Hydraulic Extruding Press



This Press has been designed to meet the requirements of present-day operating conditions. Many important features are embodied in this Press. Among these are:—self-contained unit,—rigid one-piece frame eliminating tie rods,—free open space for loading material chamber,—quick opening die head for cleaning,—flexible coupling type packing head on plunger,—rapid return speed,—and greater production.

Beatty builds a complete line of Presses, Punches and Shears, also many other Machine Tools for heavy duty work.

*May we have an opportunity of quoting
on your specifications.*

**BEATTY MACHINE & MANUFACTURING CO.
HAMMOND, INDIANA**

**400 WELDS
A MINUTE**

on production



SPECIAL, 3/8", MODEL #192

For the average job one of the many standard sizes and types of Ross valves will exactly fit every requirement.

If, as in the case illustrated above, you have one of those out-of-the-ordinary or hard-to-lick problems, simply call for a Ross engineer to help you. Always . . . Ross air valves offer maximum service, dependable operation and long life.

ROSS
Air Control
VALVES



Send for Catalog

ROSS Operating VALVE CO.
6480 Epworth Boulevard
DETROIT, MICHIGAN

AMMCO 6" SHAPER

"A precision machine of a thousand uses"



- - IT'S PORTABLE - - Saves Steps and Time

Don't tie up a big shaper when so many jobs can be done just as accurately and much quicker on AMMCO 6" PRECISION SHAPER . . . Available for stationary installation or mounted on portable cabinet easily rolled to the mechanic's workbench.

Features of this Shaper include quick adjustment of stroke, ram position, tool head, table height, table support, feed and speed . . . The maximum

length of stroke is $7\frac{1}{4}$ " . . . Table has five cross feeds (reversible) . . . Countershaft has three-step cone pulley . . . $\frac{1}{4}$ or $\frac{1}{2}$ H.P. Motor.

Manufactured by an organization having years of experience in producing precision machinery . . . Recommended by leading machine tool dealers and machine tool manufacturers.

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AUTOMOTIVE MAINTENANCE MACHINERY CO.
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is attractive prices and gives information and dimensions make ordering of standard collets easy.

and attractive prices for standard and master collets and feed fingers.

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DRAW-IN COLLETS
FOR ALL
LATHES AND MILLERS



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- DRAW-IN
- STOCK
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- DURABILITY
- ATTRACTIVE PRICES

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Refer To Ready Pages for Your Requirements
Drawing and Specifying Requirements. Keep You Up to Date on Reference Printed

Hardinge Collets are in stock for immediate delivery. Hardinge Collets include
three elements of precision which have characterized our products since 1880.

HARDINGE BROTHERS, INC., ELMIRA, NEW YORK

— COLLETS — FEED FINGERS AND PADS FOR YOUR AUTOMATIC AND HAND SCREW MACHINES

MORRISON

COLLETS

FEED FINGERS

MORRISON MACHINE PRODUCTS

BY HARDINGE BROTHERS, INC.

ELMIRA, N.Y.

SJOGREN

PRONOUNCED "SHOH GRIN"

SPEED COLLET CHUCKS

for your TOOL ROOM
and ENGINE LATHES

- ...Save Time....
- ...Increase Accuracy....
- ...Increase Capacity....

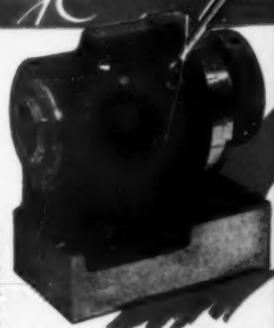


The amazing fast action of the Sjogren Speed Collet Chuck gives it full right to its name. An effortless turn of the hand-wheel, one way or the other, automatically opens or closes the collet, gripping or releasing the work as desired. With the Sjogren Speed Collet Chuck, the operator is always in front of his work and he stays there.

Supplied for direct mounting to either threaded or standard type of spindle nose. Available in three sizes to 1 1/2" capacity. A distributor is located near you. Write for his name and address.

COLLET INDEX FIXTURE

1" capacity through collet.
Index Plate holds 86 holes.
Furnished for other collets and
with either 2, 3, 4, 5, 6, 8, 10,
12, 15 or 20 hole Index Plate.
Available separately or with
a Tailstock and Sub Base.



FOR LOW COST TIME SAVING ACCURACY CAPACITY ADAPTABILITY

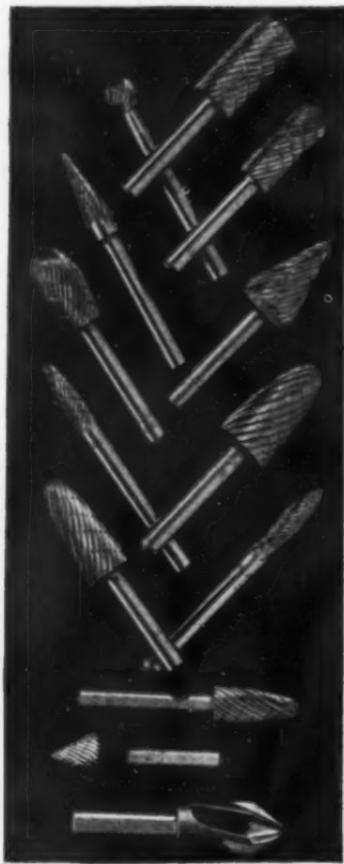


Expensive holding devices for different operations are no longer necessary because Hardinge offers a Collet Index Fixture for many uses. Its adaptability to miller and grinding applications as well as its use with a shaper or drill press makes it indispensable in modern tool rooms and production departments and its low price justifies immediate use.

Price \$45.00

WRITE TO HARDINGE BROTHERS, INC., ELMIRA, N.Y. FOR COMPLETE
LITERATURE COVERING PRODUCTS PRESENTED ON THIS PAGE

SEVERANCE



ALL SHAPES

Severance Tool Mfg. Co.

1510 East Genesee Street,
Saginaw, Michigan

Manufacturers and users of flexible shaft equipment—when you think of Midget Cutters and Rotary Files—you'll find it profitable to think of "SEVERANCE", and these pertinent facts:

Severance originated "Ground from the Solid" Cutters, is the largest manufacturer of these versatile tools in the world, and has a better understanding of the users' requirements.

Severance offers the largest variety of shapes and sizes—carries the greatest stocks and can give the quickest deliveries—reproducing any known shape of Rotary File with a Ground from Solid Cutter on short notice.

Severance follows the most versatile methods, in manufacturing cutter blanks and in grinding from the solid after hardening—so that almost every known shape of rotary file is now being ground and reground.

Just a few of the many Severance Midget Milling Cutters are shown here. Throughout the world, Severance Cutters are showing savings up to 75% and more over hand cut and mill cut rotary files and burrs and even ground (carbon) rotary files.

Write TODAY for catalogs on the full Severance line. Export inquiries are especially invited.



ALL SIZES



TUBE BURRING CUTTER

*Something to
Crow About*



NEW "L" SERIES
CHICAGO
STEEL PRESS BRAKE



BOX
AND PAN
BRAKE—



POWER BENDING BRAKE—

The Box and Pan Brake forms boxes or pans from one piece of metal. A straight brake as well as a box brake.

The Power Bending Brake is indispensable wherever a volume of heavy plate work is to be done. Forms a great variety of bends and shapes, without dies.

Send your bending problems and write for complete information on all our Press Brakes.



The World's oldest and largest manufacturer of all-steel constructed machinery announce a new low priced modern all steel press brake for the heavy sheet metals and light plate work.

All the main members constructed of rolled steel plate. Equipped with one bull gear inside each end housing. Eccentrics made in one piece with bull gears. Adjusting screws encased in supporting sleeves operate in vertical non-oscillating position. All gearing, eccentrics, ram plungers and ram adjusting worms enclosed in oil.

Ram operates at variable speeds — slow when bending long sheets or fast when forming small pieces. Change of speed is accomplished by turning hand wheel.

DREIS & KRUMP MFG. CO.

5449 LOOMIS BLVD.

CHICAGO, ILLINOIS

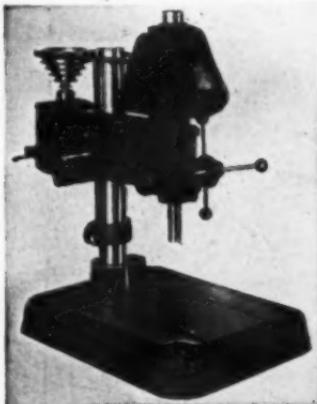


CANEDY - OTTO No. 18 ROYAL

Floor and Bench Model Drills

Featuring:

6 Speeds, 240 to 2185 with 1200 r. p. m. motor—345 to 3250 with 1800 r. p. m. motor.
 $18^{\frac{1}{2}}$ swing $5\frac{3}{4}$ " spindle travel.
Sand cast, machined V-belt pulleys.
Alloy steel 6-spined spindle, ground and polished.
High grade Lubri-seal ball bearings throughout.
Spindle cone pulley rotates between annular ball bearings.
Bench base working surface $16^{\frac{1}{2}} \times 16^{\frac{1}{2}}$, over all $21\frac{1}{2} \times 28^{\frac{1}{2}}$.



These are sturdy, dependable drills, capable of accurate drilling on rigid day-after-day production schedules. Supporting columns are rugged. The Lubri-sealed bearings assure easy running and long life. Working surface is handy—and the three spoke feed is fast and easy to operate. Capacity up to $\frac{3}{4}$ " with $\frac{1}{2}$ h. p. motor, or up to one inch with $\frac{3}{4}$ h. p. 1200 r. p. m. motor.

CANEDY - OTTO MANUFACTURING CO.
CHICAGO HEIGHTS, ILLINOIS



No. 10 Ball Bearing Punch
Capacity $\frac{3}{8}$ inch through $\frac{3}{4}$ inch iron. Depth of throat $1\frac{1}{8}$ inch. Height of throat $\frac{1}{4}$ inch. Furnished with one punch in any size from $\frac{3}{8}$ to $\frac{3}{4}$ by $\frac{1}{2}$.



**Imperial
Roller Bearing
Punches**

Offered in 3 sizes—will work inside 90 degrees. Quick changing for punches and dies—no cams to wear—stripping action is positive.

**No. 20
Ball Bearing
Punch**

Capacity $\frac{3}{8}$ " thru $\frac{1}{2}$ " iron.



**No. 4 Angle
Iron Shear**
Capacity $2'' \times 2\frac{1}{8}''$ angle iron or smaller.



**Angle Mitre
Notcher and Angle
Iron Bender**

Capacity $2'' \times 2'' \times \frac{1}{4}$ " angle iron or smaller. A pair of tools that every shop ought to have. They are Nos. 50 and 51 in our catalog.



Aircraft Rivet Squeezer
Capacity $\frac{3}{8}$ inch aluminum rivet. Spindle travel $\frac{1}{2}$ inch. Made in 5 sizes, with throat depths from $\frac{1}{4}$ to 6 inches.

Send for the complete Whitney catalog.



WHITNEY METAL TOOL COMPANY
115 FORBES ST.,
ROCKFORD, ILLINOIS

WHITNEY SHEET METAL TOOLS

Made by
Specialists to meet
every practical
need of Sheet
Metal Men.

Here are just a few of the more than 80 different types of punches, presses, brakes and metal working equipment that are manufactured by Whitney.

These are dependable items, perfected through long experience and close contact with the trade.

New Improved CUT-OFF MACHINE!

At A Fraction of Customary Prices

A powerful, accurate Abrasive Cut-off Machine designed by Delta and built according to best engineering practice — is now available for less than half the usual price of machines of this type! That's news—good news! It can be used everywhere, in large shops or small, where material of any kind has to be cut to accurate length on a production basis. At these remarkably low price levels you can actually get two cut-off machines for the price of one—machines that can be used for scores of jobs, and quickly pay for themselves in time and money saved!

Cuts Practically Any Material

This new Delta unit has an unusually wide range of applications. It will cut speedily and accurately to exact lengths such materials as steel, brass, copper, cast iron, monel metal, bakelite and all plastic materials, pipe, wire rope, stellite, tool steel, manganese steel, fibrous material such as brake linings,—tile, brick, carbon, porcelain, slate, hard rubber, concrete coping and sand cores. On metal it leaves the cut with a polished surface, thus eliminating many burring and finishing operations.

CHECK THESE MANY FEATURES

This improved Cut-Off Machine is ruggedly constructed with heavy castings throughout—wide spaced Timken roller pivot bearings and double arborsealed-for-life bearings requiring no lubrication — powerful Texrope V-belt driven—adjustable fence—accurately machined table. It is perfectly balanced, making for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards. Capacity up to 2 inches diameter, or material up to 2 inches by 6 inches. Shipping weight, less legs, motor, V-belts, motor pulley or abrasive wheel, 370 lbs.

DELTA Mfg. Co.

Industrial Division

103 EAST VIENNA AVENUE

MILWAUKEE, WISCONSIN



Send for
"Cut-Off" Bulletin

giving full details and
prices on the Delta
Cut-off Machine and
all accessories.

\$65.00

Model 1600 complete without legs, motor, belts, motor pulley or abrasive wheel.

Delta Manufacturing Company
629 E. Vienna Avenue, Milwaukee, Wis.

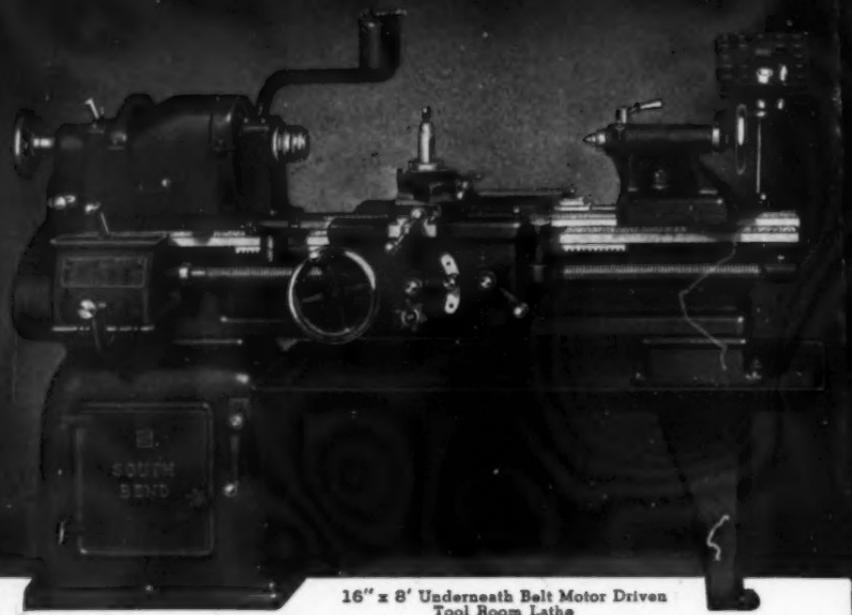
Please send me special bulletin on the new Delta
Cut-Off Machine. Also send latest Delta Catalog of
Industrial Power Tools.

Name _____

Address _____

Firm _____

City _____ State _____



16" x 8' Underneath Belt Motor Driven
Tool Room Lathe

SOUTH BEND LATHES FOR PRECISION WORK



DOUBLE WALL APRON

Back view of the Double Wall Apron showing the rigid, one-piece box type construction that provides a substantial support for both ends of the gear shafts.

Gears in the apron are of steel and have a reservoir and felt wick automatic oiling system. Worm drive assures smooth operation of feeds on all classes of work.

South Bend Lathes have been giving thousands of users dependable service on the most exacting classes of precision machine work for more than thirty years. Sound design, the most expert workmanship and the best materials available are combined in South Bend Lathes to give them permanent accuracy and efficiency.

SIZES AND TYPES

Manufactured in 9", 10", 11", 13", 14½" and 16" swing, bed lengths 3' to 12', in Motor Drive and Countershaft Drive. Attachments are available for production, tool room and general machine work.

New South Bend Lathe Catalog

Write today for a copy of our new 112-page lathe catalog describing all Sizes and Types of South Bend Lathes, chucks, tools and attachments.

SOUTH BEND LATHE WORKS

LATHE BUILDERS SINCE 1906

768 E. Madison St., South Bend, Ind., U.S.A.



The Editor's Page

With this issue, we extend friendly greetings to many new readers of The BLUE BOOK in South America. The European turmoil has made it difficult, and in many cases impossible to obtain equipment and supplies from that section of the world. We take pleasure in bringing to your attention, the products of leading American machine tool builders, knowing that they will serve you well.

The Business Picture . . .

Levels remain above the high points of '37—and in certain lines higher than the all-time peaks of 1929, yet the trend so far this year indicates a moderate decline.

There is nothing to indicate any serious recession during the early part of the year—nor are there symptoms of any further sharp upward movement. In other words, neither depression nor boom is in sight.

Expansion has been greatest in the durable goods lines. Sustained prosperity usually is based on investments in capital goods. In that way, the recent splurge has been more soundly based than the temporary upturns of recent years. The abnormal influence of war and armament expenditures have been important factors. In reality though, most of the upturn has been due to domestic purchasing—permanent improvements in equipment and machinery.

The Road Ahead . . .

Business has improved and production is high, but urgent problems remain unsolved.

Because of the population increase, the present high production does not represent an output per person of more than 80% of that attained during the last period of prosperity.

Ten years have passed without reach-

ing new peaks in the output of goods and services—for the first time in our history.

A major problem for industry, government and labor is to work out a balance in the industrial system that will further expand production.

Closely identified with this is the matter of unemployment. In spite of our present industrial activity, we have a total of between 6,000,000 and 9,000,000 without jobs.

A successful economic system should provide maximum employment at wage rates which will not make the costs too high for business to operate—at the same time providing the consumers with purchasing power to buy the goods produced.

Industry and labor must cooperate to provide the maximum amount of permanent employment.

Fuller cooperation between government and business is another vital problem. Business men, at least, must make income equal outgo—and a clearer understanding of the hazards and hardships of business should result in more constructive policies. Such an understanding would go a long way to help make the new decade far more prosperous than the past ten years.

New England Show . . .

One of the most important tool and equipment exhibits ever held in the East is scheduled for Bridgeport, Conn., March 6, 7, 8 and 9. The sponsors are the Bridgeport Tool Engineers' Association. The show will be housed in the State Armory, 1494 Main Street.

Two interesting technical sessions are scheduled. At least 150 of the leading manufacturers will display their latest machine tool and equipment offerings.

Can you afford to miss it?



Consider Labor Costs When Buying Steel

On most jobs, shop labor costs are the biggest single factor—and they depend to a large degree on the steel used. If bars are too hard for bending or forming—or have hard spots to break or dull tools—if some shapes are not straight—or if in the case of alloy steel the required properties are not developed by the first heat treatment—then up go costs, down go profits.

Purchasing steel that is uniform and has the properties most desirable for your particular use often pays big dividends in the form of decreased shop costs. You do not have to pay any more for this kind steel—so why not get it?

For several years Ryerson has been building up stocks of these better, more uniform steels. Careful selection, checking, testing, and inspecting assure the uniform high quality necessary for Ryerson Certification. Try Ryerson Certified Steels on your hardest job—and check the labor costs. Many have told us that it pays.

Joseph T. Ryerson & Son, Inc. Plants at: Chicago,
Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland,
Buffalo, Boston, Philadelphia, Jersey City.



RYERSON

Standards Reduce Costs

Emphasizing Manufacturing Simplification and Savings
Effectuated Through Rational Standardization.

By T. K. ROBERTS
Wm. Sellers & Co., Inc.,
Philadelphia

STANDARDS reduce shop costs in every phase of shop activity—in design, in manufacturing, in estimating, in accounting. And since lower costs can be reflected in lower prices, with the same dollar margin of profit, a larger volume of business can be built up with standardized products than with non-standardized. Where competition is keen, the difference in cost between the two usually determines placement of the order.

Standards apply not only to design

and construction. They apply also to shop methods. The two go hand in hand. The manufacturer who has standardized his product but not his methods, easily may have manufacturing costs so high as to be completely out of the running when competitive bids are under consideration. The most skillfully designed machine in the world is just so much scrap iron if it cannot be sold, and price is a major consideration in these days of hard fighting for business.

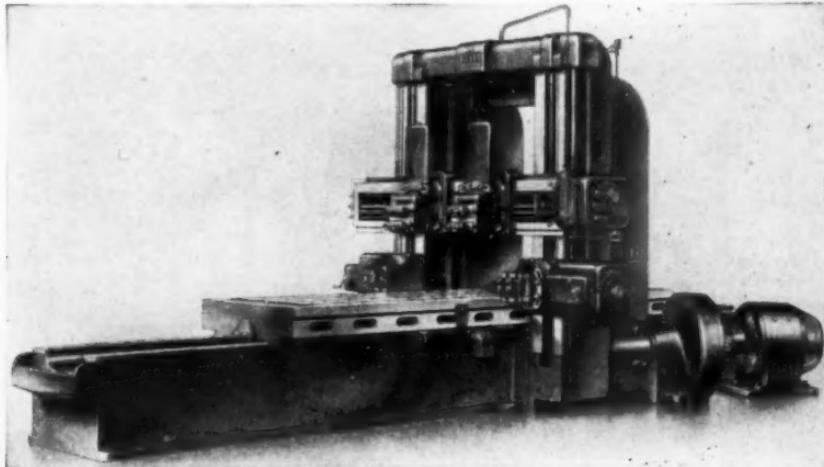


Fig. 1—A planer built entirely of standard units. By substituting other standard components for certain units on this machine, a different size or type of planer can be made.
(See Fig. 3)

Table 1—Dimensions of Standard T-slots and T-nuts.** (See Fig. 1.)
A.S.A. B5a-1927. All dimensions in inches

Diam. of Bolt, <i>D</i>	T-Bolt			T-Slot			T-Nuts			
	Threads per inch	Width Across Flats, <i>H</i> , max.*	Height of Head, <i>T</i> , max.†	Width of Throat, <i>S</i>	Depth of Throat, <i>B</i>		Head Space		Width and Length of Nut, <i>T</i> ‡	Height of Tongue, <i>J</i> §
					Max.	Min.	Width, <i>W</i>	Depth, <i>C</i>		
1/4	20	15/32	5/32	9/32	2/8	1/8	9/16	15/64	9/16	3/16 0.330 3/32
5/16	18	9/16	3/16	11/32	7/16	5/32	21/32	17/64	11/16 1/4 .418 1/8	
3/8	16	11/16	3/4	7/16	9/16	7/32	25/32	21/64	7/8 5/16 .343 7/32	
1/2	13	7/8	5/16	9/16	11/16	5/16	31/32	25/64	1 1/8 13/32 .666 7/32	
5/8	11	1 1/8	13/32	11/16	7/8	7/16	1 1/4	31/64	1 5/16 17/32 .783 1/4	
3/4	10	1 5/16	17/32	15/16	1 1/8	9/16	1 15/32	9/8	1 11/16 11/16 1.033 5/16	
1	8	1 11/16	11/16	1 1/8	1 1/4	3/4	1 27/32	53/64	2 1/16 15/16 1.273 3/8	
1 1/4	7	2 1/16	15/16	1 5/16	1 9/16	1	2 7/32	1 3/32	2 1/2 1 3/16 1.523 7/16	
1 1/2	6	2 1/2	1 3/16	1 9/16	1 15/16	1 1/4	2 31/32	1 11/32		

* A tolerance of -0.031 in. is allowed on all sizes.

† A tolerance of -0.016 in. is allowed on sizes $1/4$ to $5/8$ in. inclusive, and of -0.031 in. on sizes $2/4$ to $1 \frac{1}{2}$ in. inclusive.

‡ A tolerance of -0.063 in. is allowed on sizes $1/4$ to $5/8$ in. inclusive, and of -0.094 in. on sizes $2/4$ to $1 \frac{1}{2}$ in. inclusive.

§ A tolerance of -0.031 in. is allowed on sizes $1/4$ to $3/4$ in. inclusive, of -0.047 in. on 1 in. size, and of -0.063 in. on $1 \frac{1}{4}$ and $1 \frac{1}{2}$ in. size.

¶ A tolerance of -0.010 in. is allowed on sizes $1/4$ to $5/8$ in. inclusive, and of -0.015 in. on sizes $2/4$ to $1 \frac{1}{4}$ in.

On the other hand, where methods are highly standardized, but design is not, the effect on costs may be, and often is, equally disastrous. When every part, or a large majority of the parts entering into the construction of a machine must be made especially for that machine, design costs, and machining and assembly costs usually skyrocket. The inevitable results are a decreasing volume of business because of high prices, or sales made at a loss or at such low profit margins that the sheriff sooner or later steps in.

A case in point was that of a large machine manufacturer during the World War. Every new machine up to that time had been designed down to the last bolt and set-screw. The number of special bolts, cap screws and machine screws shown on his drawings was enormous, running into the thousands. Every one had to be specially made when a particular machine was built, with resulting high costs and delayed production. The demands of war could not tolerate such a condition. A survey of the drawings showed bolts and screws varying in diameter by $1/32$ in., and in some cases by $1/64$ in. Bolts and screws were

standardized promptly to commercial sizes, and then were bought in quantity from companies specializing in those products. The savings in cost were great, the time of production of completed machines was shortened materially, and most important of all, the capacity of the shop was increased by the release of equipment formerly used to make the special items.

What are Standards?

A few definitions at this point may serve to clarify the subject.

Standard Machine.—A machine that always is built to the same design and specifications.

Standard Machine with Attachments.

—A standard machine to which has been added standard or special attachments, to adapt it for special work, extend its range of usefulness, or for any other purpose. For example, a hori-

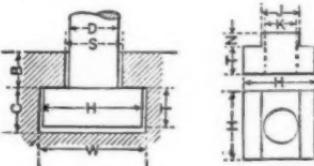


Fig. 2—T-slot bolts and nuts.

zontal boring, drilling and milling machine fitted with a revolving table, or a precision measuring device.

Special Machine.—A machine built for a special purpose, and one that is not a part of the regular product. A special machine may be based on a standard machine, or built of standard units, or it may be built of parts designed for it alone. Example.—Turret track turning machines, used to finish in place, the tracks of battleship turrets.

Standard Unit.—An assembly of parts, made always to the same design and specifications, which can be used for the same or different purposes in a variety of machines. Example.—A planer head or a gear box.

Special Unit.—An assembly of parts designed to accomplish a special purpose, and not intended, usually, to be repeated or used for any other purpose. Example.—The feed mechanism of a turret track turning machine.

Standard Part.—A part that always is made to the same design, dimensions and specifications. It may be used in a variety of machines and units, and for a variety of purposes. Example.—Gears, clutches, bearings, pins, bushings, shafts, etc.

Special Part.—A part made to serve a particular purpose, and one which may or may not be used for purposes other than those for which it was originally designed. A special part may, and often will, become a standard part.

Standard Operation.—A method of performing a job of work that is always the same under identical conditions.

Standards of Design.

Design standards range all the way from complete machines down to the last set-screw. The easiest way to standardize is to start with the individual parts, such as bolts, machine screws, cap screws, pins, collars, bushings, shafts, spindles, gears, pulleys, etc. The standards of the American Standards Association and of the Society of Automotive Engineers cover these and many other items, and can be used by the great majority of man-

ufacturers as the basis of their individual standards. Other A. S. A. and S. A. E. standards also will be found useful, as dimensions for T-slots, standard thread forms and tolerances, tolerances for various classes of fits, etc. A typical American Association standard is given in Table 1.

Standard Parts.

After design standards of individual parts have been established, it should be a requirement of the design department that these should be used exclusively in the design of units and machines. A rigid rule should be established that the designer cannot use other than standard parts except by express permission of the chief engineer or some one of equal authority. Where the exigencies of design are such that a standard part cannot be used "as is," a study should be made to determine whether a modification of some standard part will prove satisfactory. For example, assume that bushings are made in standard lengths varying by $\frac{1}{4}$ ". Because of other considerations of design, a bushing $2\frac{1}{4}$ " is indicated. If it is not possible to modify the design to take a standard 2" bushing, a $2\frac{1}{4}$ " standard bushing would be cut down to the requisite length. This is so obvious as to seem almost foolish as an example. Nevertheless, I have seen a new pattern made and a new standard length of bushing established in exactly this situation.

Similarly, standards can be established for bolts, cap screws, etc., varying by definite increments of diameter and length, and with certain tolerances to adapt them to different classes of use. If the A. S. A. standards are adopted, it is quite probable that these items can be purchased to advantage from companies equipped with screw machines. It should be borne in mind that the smaller the number of standard sizes adopted, the lower will be the inventory to be carried, and here again the savings may amount to a considerable figure. If careful attention is given to the selection of standard sizes, then standard bolts or screws will answer in the usual and most of the unusual cases. For example, a $31/32$ " bolt may be indicated

as the proper bolt to use in a certain situation. No harm will be done if a 1" bolt is used, and quite frequently a 15/16" bolt can be substituted equally well.

Every manufacturer must decide for himself, the parts entering into the construction of his product that can best be standardized. The easy way to undertake the job is to study the drawings and the material lists, noting the types of items that are used most frequently, such as bolts, screws, gears, shafts, etc. Each class of part should be tabulated to show the sizes that are used, and all odd sizes then should be studied to ascertain whether or not a size that conforms to some established commercial standard can be used instead. A study of this kind will be quite revealing to the average manufacturer, particularly if he examines his inventory at the same time. He probably will discover that odd sizes are an expensive luxury when measured in terms of a large and slow moving inventory.

The savings due to standardized parts will be considerable in the drafting room. They will be much larger in the shop. It is obvious that much time can be saved in making drawings if a part can be indicated by a few conventional lines and designated by a standard number, as compared to the

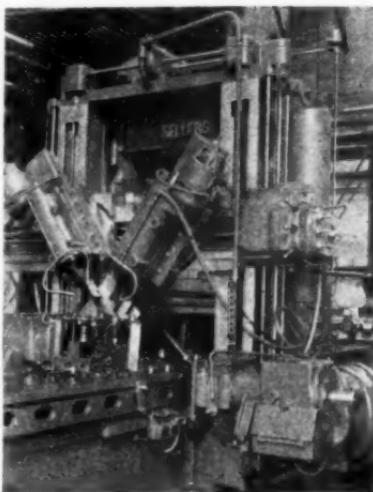


Fig. 3—A standard planer with two special units. The heads on the cross rail are so arranged that the tool cuts both on the forward and return strokes. This machine was built to cut slots in the rotors of electric motors and generators.

time required to make a completely dimensioned detail drawing. In the shop, standard parts can be made in quantity with but a single set-up for the lot. Special tools, jigs and fixtures will reduce machining time with consequent

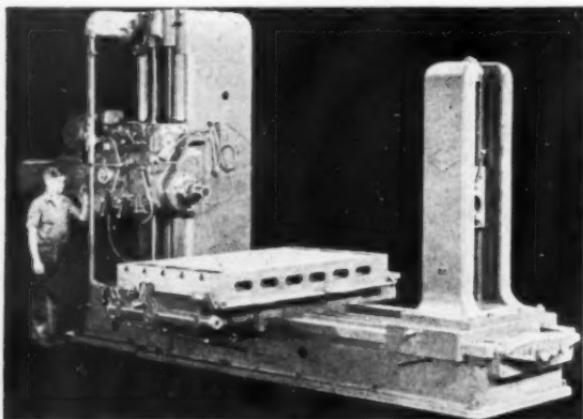


Fig. 4—A standard horizontal boring, milling and drilling machine. The bed, column, head and outboard support are all standard units, made of standard parts. The table is one of a series of standard sizes that can be fitted to the machine to meet the customers' requirements.



Scene from the Universal picture, "Tower of London"

BUSY hammers strike shimmering metal and gentle files polish delicate edges. You might be in merrie England of four hundred years ago. But, rubbing your eyes, you realize you are in Hollywood, land of surprises.

- **Time:** The present.
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savings in labor cost, and in what usually is more important, burden charges. For every dollar saved in the drafting room, two to three dollars usually will be saved in the shop.

Standard Units

The same considerations that apply to standard parts apply in greater degree to standard units. The same savings in design and machining are made and, in addition, savings in assembly are possible. A further advantage is that with standard units available for use in a variety of machines, the inventory of parts for producing promptly, a complete line of machines over a range of sizes is much reduced.

Consider, for example, the ordinary double-housing metal planer. Excluding the hydraulic type, these usually are built in standard sizes of 48" x 48", 60" x 60", 72" x 72", and 84" x 84". While most manufacturers have standard designs for sizes larger than these, they generally are considered as special machines. These standard planers comprise the following main groups or units:—Bed, table, drive, housings, cross-rail, cross-girt, feed mechanism, rail-heads and side-heads. The bed and table can be standardized as regards cross-sectional dimensions. Lengths are varied to suit the requirements of individual customers. Except for these two parts, all other units can be standardized and carried in stock, completely machined and ready for assembly. Further, certain parts and certain units can be used on different sizes of machines. For example, the 48" and 60" planers both can use the same rail-heads and side-heads, and the same feed mechanisms. Consequently, these units can be manufactured in lots and can be assembled into either size of machine as required. The number of units that must be made will be smaller than would be necessary if the manufacturer had different units for each size of machine and desired to hold himself in readiness to make prompt deliveries on either size. Machining, assembly and inventory costs all would be lower. The same considerations would apply to the

drive units. The two sizes under discussion also might use the same cross-rail except that the length of the cross-rail would be different in the two cases. Here standardization effects a saving in pattern costs. A single pattern for the smaller size planer is sufficient. This can be shifted in the sand when molding, or can be constructed so that a loose piece can be fitted to lengthen it sufficiently to make the longer cross-rail.

Standardization of units lends itself to the construction of special machines with a minimum of design, pattern and machining costs. For instance, a prominent manufacturer had need of a 56" x 48" planer, which is not a standard size. By the use of standard units this machine was constructed at a minimum of cost with but two or three special patterns and two or three pattern alterations. The bed of the standard 48" planer was used, and the 48" table widened by means of loose pieces on the pattern. The standard 48" housings were employed and the space between them widened by special cheek blocks between them and the planer bed. The cross-rail and the cross-girt were widened without pattern change by shifting the pattern in the sand. The cross-rail screws and spline shafts were non-standard as regards length, but were the same in all other respects. The feed mechanism at the end of the rail was standard as was the lifting mechanism for the rail. The only change necessary in the drive mechanism was the substitution of a slightly longer drive shaft to compensate for the added width of table. Thus, it was possible to build this special planer largely from standard parts which had been manufactured in quantity, by the most economical methods. It is obvious that had this machine been designed especially, its cost would have been greatly increased and the price necessary to return a profit might have been prohibitive.

Standard Methods.

In relatively few metal working shops, except those operating on a mass production basis, are methods of operation standardized to any where

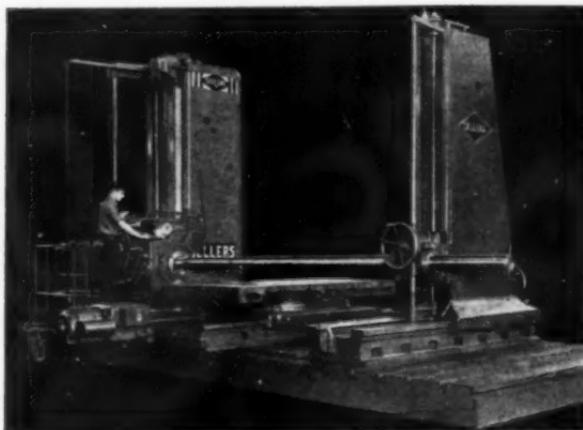
**RESPONSIBILITY**

In every walk of life, in every profession, responsibility goes to those who can take it. In industry, it's the JACOBS CHUCK which is honored with the responsibility of functioning at the business end of almost all drilling and tapping machines and portable tool equipment.

IF IT'S A JACOBS IT HOLDS!

The Jacobs Manufacturing Co.
Hartford, Conn., U.S.A.

Fig. 5—A large horizontal boring, milling and drilling machine, with a revolving table. Everything entering into this machine is standard, even the revolving table which is a standard attachment, made in several standard sizes to suit customer requirements.



nearly the degree that is possible. Standardization in the shop not only is possible on jigs and fixtures, but also can be extended to forms of cutting tools, to speeds and feeds, to machine set-ups and to methods of assembly. Lack of standardization in the shop can be traced principally to two causes:—1. Lack of knowledge on the part of management of what is possible in the line of standardization, and ignorance of the full possibilities of the productive equipment. 2. The individual idiosyncrasies of the workmen and their lack of knowledge also of the possibilities of their machines and of their cutting tools.

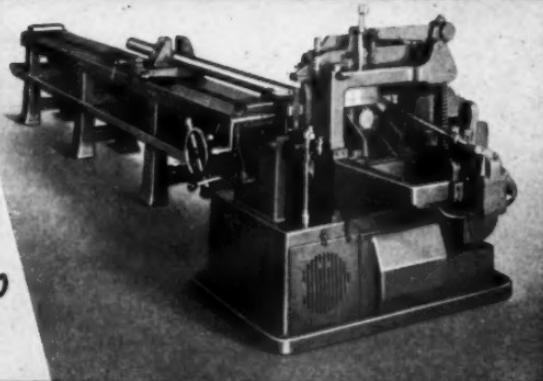
Standardization of methods is a two-fisted job on the part of management. The chief executive in charge of manufacturing first must convince himself of the advantages to be gained and the profits that will accrue therefrom. Then he must make himself familiar with the best methods that are possible with his type of equipment and product and insist on these methods being used. If he can sell his ideas to his subordinates in the manufacturing division and make them as enthusiastic on the subject as he is himself, his task is relatively simple. If, however, those to whom the job of stand-

ardization necessarily must be entrusted, are not whole heartedly in sympathy with the idea, his methods must be more direct and brutal. It may be emphasized right here that any superintendent, foreman, or gang boss, no matter how good he is in other respects, who will not co-operate to the extent of his ability to reduce costs by whatever means possible, and who is not willing to admit at times that other men may know more than he, is better off the payroll than on it. Standardization of shop methods is one of the quickest ways to reduce costs in the machine shop that can be devised.

In every large shop that has not adopted centralized tool grinding there will be found, as a rule, almost as many different forms of tools as there are workmen in the shop. The average good machinist will admit that he can grind a tool better than any other man in the shop. In a group of 25 machinists it is quite probable that one would find 25 "best" forms of the same tool, and probably not over half a dozen would approximate the form that careful study, research and experiment have proved to be the best. It is obvious, therefore, that one of the first points of attack in the standardization of shop methods should be on tool forms. A corollary to this is

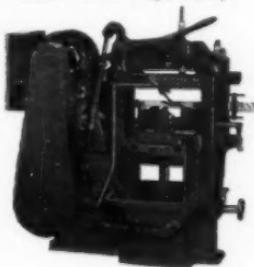
Peerless High Duty (Automatic-Hydraulic) Metal Sawing Machine with automatic bar feed — 6" x 6". (Also in 9" x 9").

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Peerless High Duty (Hydraulic) Metal Sawing Machine — 10" x 10". (Also 6½" x 6½" and 14" x 14" cap.).



Standard Type for general purpose and production sawing. 6" x 6". (Also 9" x 9" and 13" x 16").

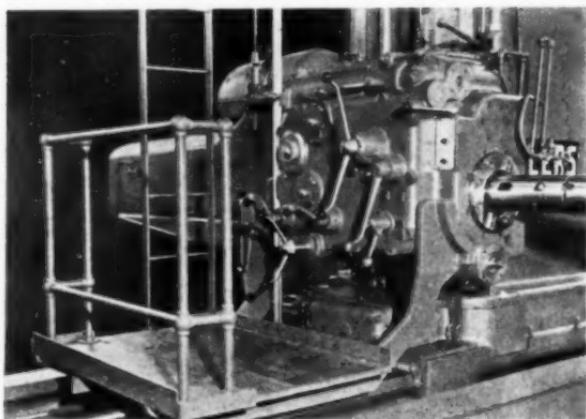
Performance of Peerless Standard and Vertical Machines — cutting speed, accuracy, and blade life — far outdoes ordinary hack saw practice. The Universal and High Duty Machines have the patented Peerless Compensating saw feed and Four-sided saw frame guided on 8 slide bearings with tool steel inserts providing the fastest cutting time, highest accuracy, and lowest blade and upkeep costs in metal sawing.

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Peerless Metal Sawing Machines

Fig. 6—Detail of the head of a horizontal boring, milling and drilling machine. This head is made of standard parts throughout, and with a slight change of several parts can be adapted to different sizes of machines.



centralized grinding in the tool room of all cutting tools. Tools then will come to the shop always ground exactly alike for the various purposes for which the several varieties are to be used. Given a standardized form of tool and a given depth of cut, the speed and feed at which this tool can be used to insure the maximum of productivity, can be predicted with uncanny accuracy, and with the knowledge that identical results can be obtained every time that the conditions are the same. It is noteworthy that when feeds and speeds are standardized in accordance with the information that now is available as a result of research and experiment, the operation time has been decreased, usually not less than 15% and often more than 25% below that which was possible under unstandardized conditions. This may be illustrated by an anecdote concerning a lathe hand and his introduction to standardized tools.

Certain data concerning tool forms and the speeds and feeds that were possible with them had come into the hands of the management of a large machine shop. A series of tests was instituted to prove the worth of these data to the company in question. One of the new forms of tools was handed to the lathe hand with instructions to use it at the specified speed and feed,

which represented a metal removal of about twice what he considered feasible. The lathe hand, who was rated as a good one, protested, first that the tool would not stand up, second, that there was not adequate power in the machine to pull the cut, and third, that the speed called for would burn the tool up in a few minutes. Nevertheless he did as he was told and much to his surprise turned out over double the quantity of work in a given time, and the life of the tool was at least 50% greater than the life of the tool he had been accustomed to using. At the conclusion of the tests, which ran for several days, the man took the tools back to the tool room and instructed the tool crib attendant to save those tools for his special use whenever he had a rough-turning job to do.

The average machine shop can standardize feeds and speeds for its usual operations and on all the various materials that enter into its product. It can do this by one of two methods:

1. It can depend on the knowledge of its own men and select as standards the best performances in existence in the shop at the time. It then can experiment to improve these standards, and as each improvement demonstrates itself, it becomes the new standard. This is a cut and try method, but is inexpensive. It has the disadvantage,

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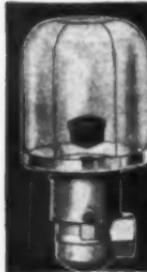
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10 TOOL CHANGES



Fig. 7—A drill grinder which insures that all drills are ground exactly alike—standardizing drill grinding practice.



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Milwaukee, Wisconsin

however, of being slow and laborious and not productive of a quick reduction in cost.

2. Advantage can be taken of the results that have been obtained by other manufacturers and by the researches conducted by scientific societies and other investigators, which have been published in the proceedings of engineering societies and in the technical press. The earliest of such standards were set up in 1908 by Taylor in his classic paper "On The Art of Cutting Metals." The tool forms, feeds and speeds laid down by Taylor have been standard practice for many years. They represented a tremendous advance over standards in common use at that time. Since Taylor, a host of investigators have steadily improved on his practice until today there is available a wealth of material which the machine shop can use to good advantage in setting standards of feeds and speeds that are far above the average performance. The latest of these investigations is covered in the report of the Committee on Metal Cutting Data of the American Society of Mechanical Engineers, which is now on the press and shortly will be available to manufacturing industry. The standards set up in this report cover a wide range of tools and materials. They may be used as basic standards with the certainty that they represent performance that is far in advance of average practice.

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- FAMCO -

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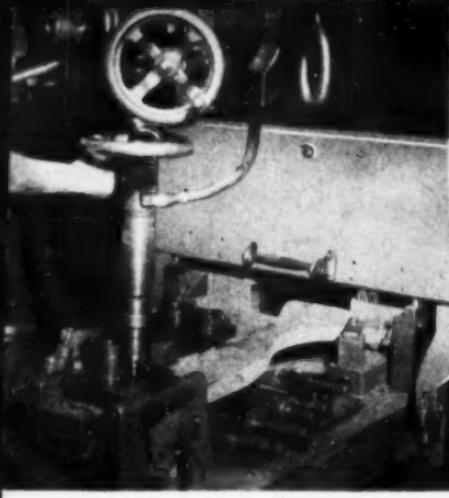
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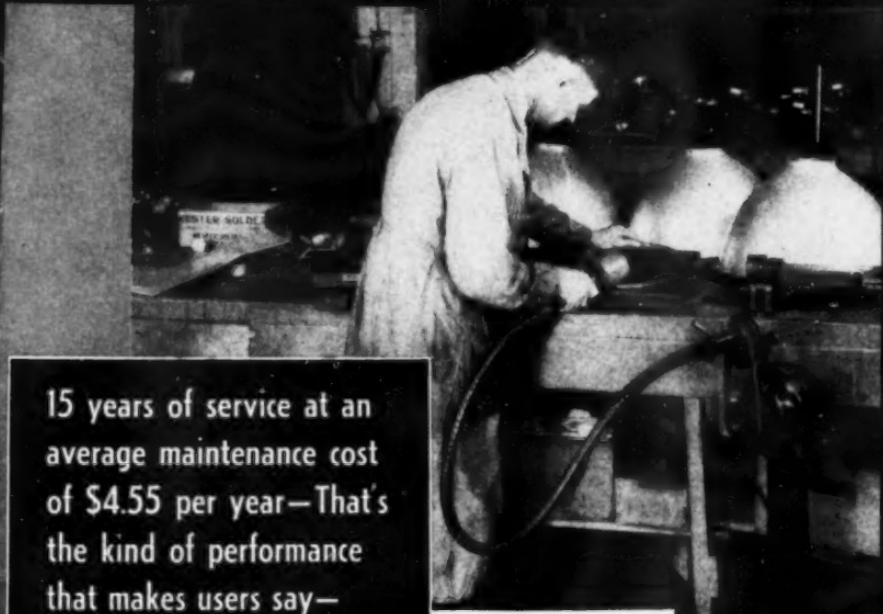
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in the cross-section sketch in Fig. 3.

Finishing a punch like this is done by grinding. The first grinding operation is to remove the excess deposit on the ends. This is accomplished with a Norton 46-M5BE wheel or an equivalent, operating at a surface speed of between 2,800 and 4,200 ft. per min. The side wall of the punch is then ground in a tool post grinder using the same grade and grain of wheel at the same surface speed. When finished, the hard-faced punch should appear, externally, the same as the original punch. A cross section of it is presented in Fig. 4.

Trimming, blanking, forming, and shearing dies of most types are hard-faced in the same manner. Here again, it is best to choose a steel which does not require heat-treatment after welding. An excellent die can be made by hard-facing blanks of 0.40 to 0.50 per cent carbon steel or steel of the same carbon content and containing 0.45 to 0.75 per cent chromium and 1.00 to 1.50 per cent nickel, such as S. A. E. 3140. All that is required of the steel is that it be sufficiently strong and tough to support the hard-facing alloy on the working edges.

The die should be recessed in much the same manner as the punch shown in Fig. 2. In the case of a simple ring die for stamping, the recess should appear as shown in Fig. 6. Dies of more complicated shapes, such as that shown in Fig. 7, should be recessed in the same manner. Before hard-facing, the cross section of the grooved

working surface of all irregularly shaped dies should be similar in shape to that specified. The groove can be made either by machining or grinding.

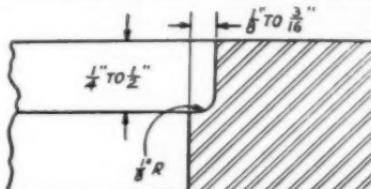


Fig. 6 — Enlarged section showing method of grooving dies prior to hard-facing.

In general, the depth of the recess should be greatest in the direction of greatest stress; the ratio of widths being about $2\frac{1}{2}$ to 1. For example, on a die used for stamping material up to 1/16 in. in thickness, the groove should be about $\frac{1}{8}$ in. deep, measured from the side of the working edge, and about $5/16$ in. deep, measured from the face of the working edge. Dies for thicker material can be recessed correspondingly deeper, but it is never necessary to make the groove more than $\frac{1}{4}$ in. deep, measured from the side wall, nor more than $\frac{5}{8}$ in. deep, measured from the working face.

The inner concave corner of the recess should always be rounded with a radius of at least $\frac{1}{8}$ in. If the corner is square, it will be impossible to obtain the proper bond between the hard-facing alloy and the steel in this

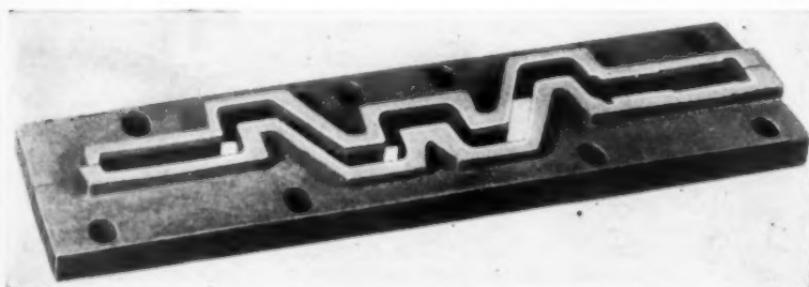


Fig. 7—This die for hot-trimming crankshaft forgings has hard-facing alloy deposited in a groove similar to that sectioned in Fig. 6.

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area, as the heat of the welding flame will melt the walls before the bottom of the angle can be brought to the required condition of "sweating." Rounded inside corners are therefore necessary in every instance. The groove should also be cleaned of all chips, dirt, and other foreign material.

Small dies, 3 in. in diameter and less, require no preheating other than with the welding flame. Larger dies, however, should be preheated to a dark red heat—about 840 deg. F. This can be done readily on an open-top temporary brick furnace heated with a gas flame. It is best, in the case of large dies, to arrange the furnace so that the die can be held in a fixture which supports it evenly and allows it to rotate to facilitate the hard-facing operation. Such a fixture can be made of discarded automobile parts and should be designed to hold the die somewhat as shown in Fig. 8. If the die has to be removed from the furnace during hard-facing, it should be kept as near 840 deg. F. as possible being reheated in the furnace if the heat of the hard-facing operation is insufficient to hold the temperature within 200 to 300 deg. of the temperature desired. Keeping an even temperature during hard-facing avoids uneven contraction between the hard-facing deposit and the base metal and often prevents warpage.

As soon as the die has been preheated, it is ready for hard-facing. Its position for hard-facing should be such that the molten alloy is well supported by the steel at all times during welding. If the die cannot be held in a fixture, it should be placed on a welding table and propped up with bricks so that the flat surface of the groove to be filled with alloy is nearly horizontal during welding.

The same hard-facing rod is used for punches, 3/16 or 1/4 in. in diameter, as well as for the application to the working edges of dies. The welding operation consists of filling the groove completely with the rod by the oxy-acetylene process, making sure that the farthest recess of the groove is sweating properly before the rod is flowed on and that the deposit is thick

enough to allow plenty of metal for finishing. Here again, the deposit is built up about 1/16 in. above the surface of the steel on each face.

Whenever practical to do so, use a hard-facing rod sufficiently long to complete the deposit without interruption, and hard-face the entire wearing edge of the die as steadily and continuously as possible. As a matter of guidance, the hard-facing rod required to hard-face an area having a cross section of $\frac{1}{8}$ in. by $\frac{3}{16}$ in. and 12 in. long, is approximately $\frac{1}{3}$ lb. As about 20 in. of $\frac{1}{4}$ in. diameter rod weighs $\frac{1}{3}$ lb., and about 10 in. of rod is required to hold the rod conveniently, a 30 in. length is needed. When the starting point is reached, and the deposit is joined to form a complete ring, care should be taken to see that the union of the deposit is thoroughly

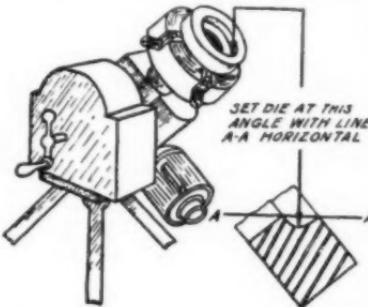
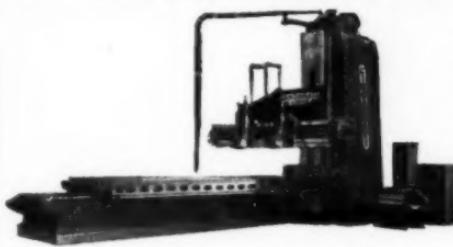


Fig. 8—Here is a typical fixture which can be used for holding a die while it is being hard-faced in a furnace. It is important that die be set at the proper angle so the steel supports the molten alloy during the hard-facing.

fused. This is done in the same manner as mentioned above.

After the deposit has been completed, the die should be rotated in the welding jig with the welding flame being played over the deposited alloy. The alloy should not be melted, but the flame should be played steadily and progressively around the deposit so that the temperature of the entire area is uniform. If this is done, the contraction of the deposit will not set up strains and cause warping. Final-

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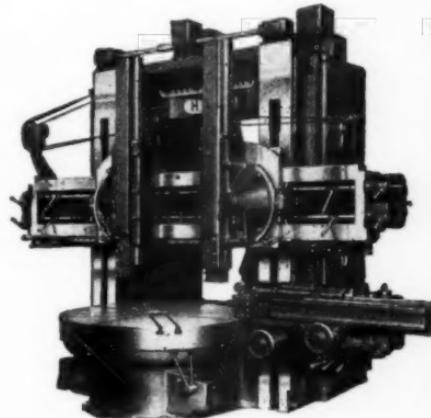
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Fig. 10 — This hard-faced punch was used to hot-punch the slug out of 0.80 per cent carbon steel, $\frac{3}{4}$ " in thickness.

ly, the die should be allowed to cool slowly in the furnace with the heat shut off, or it should be buried in powdered lime or mica.

After the die has cooled, it is ready immediately for finishing. First, the alloy on the working surface of the die should be ground, on a surface-grinding machine if the die shape lends itself to that method. For this purpose a 50-G8BE wheel or its equivalent should be used, operating at a peripheral speed of between 2,800 and 4,200 ft. per min. The side of the die is then ground in the same manner as hardened steel dies. Here, however, the wheel used should be a Norton 3860-K for small holes, or a Norton 1960-L for larger holes. Equivalent vitrified wheels of other brands can, of course, be used. The surface speed should be the same as mentioned above. For intricate die work, requiring hand-grinding, the wheels should be as similar in grade and grain to those recommended as is possible. Fig. 9 illustrates how the cross section of the finish-ground working edge of a die should appear. The shape of the deposit in this sketch is essentially that to be attained no matter what the outline of the die may be—whether circular, oval, or for complicated shapes such as those used for trimming crankshafts.

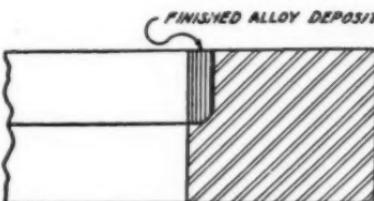


Fig. 9—This section of a die shows the finished alloy deposit.

One or two examples will bear out just how economical hard-facing can be. A manufacturer of wrenches has found that hard-facing the punches for punching the wrench openings increases the punch life by a ratio of 13 to 1. Plain steel punches formerly lasted for 600 holes; hard-faced, they now punch 7,800 holes. The wrenches are 0.80 per cent carbon steel and are formed from $\frac{1}{4}$ -in. to 1-in. stock. This, of course, is a hot-punching operation. The punch and a slug removed from $\frac{3}{4}$ -in. stock are illustrated in Fig. 10.

At a Michigan forge company, carbon steel dies averaged only 500 pieces on one hot-trimming operation. The company is now obtaining 6,970 pieces from a hard-faced hot-trimming die.

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The actual cost of hard-facing this die was only \$14.87, yet on this application alone, the manufacturer who submitted these figures estimates a saving of \$40.00 per day.

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steel die. The hard-faced cutting edges of a trimming die last, under normal working conditions at this plant, for 2 months without regrinding, making approximately 20,000 cuts per day. The total life of the hard-faced dies is about 2 years. Formerly, a tool steel die required grinding at least once a week and had a total life of but 6 months. Thus, the use of hard-faced dies not only resulted in a greatly prolonged life for the dies, but hard-facing also cut the grinding costs and the number of necessary shutdowns to about 11 per cent of their former value.



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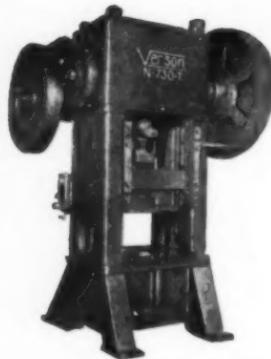
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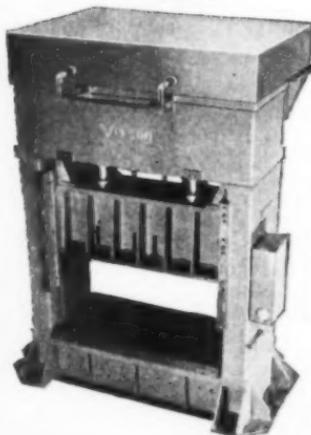
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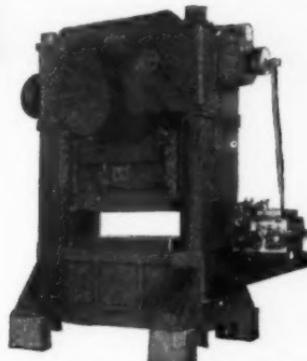
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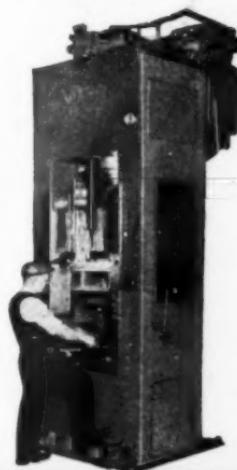


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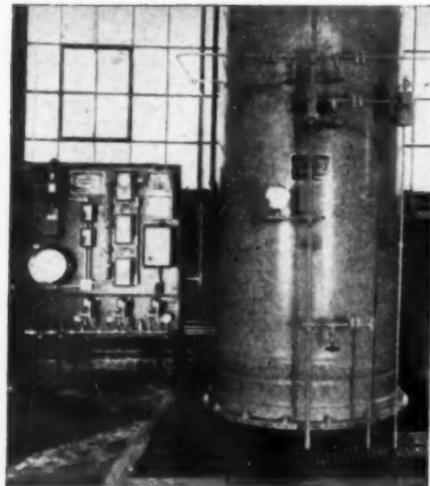




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Solving Inspection Problems By Projection

By JOHN W. KING
Jones & Lamson Machine Co.,
Springfield, Vt.

(This concludes a series of three articles on Projection Inspection. Other installments appeared in the January and February issues.)

pen, typewriter, or set our message in type, optical inspection has its part in

THE increasingly important part which projection inspection plays, either directly or indirectly in the manufacture of parts for nearly all machines and products is even greater than might appear. For not only are most taps and dies for making screws and nuts made more accurate by projection inspection; and parts of many mechanisms, but a good share of the things we encounter in everyday life are made cheaper and better with projection inspection. In the morning we are awakened by clocks whose parts are inspected by this method; and we shave with optically inspected razors. When we go down to breakfast, our glass of fruit juice more than likely came in a container, a part of which was inspected optically. In fact, almost any food which comes in bottles or cans is almost certain to be better and lower in price than it would otherwise be, if projection inspection did not make considerable savings in the manufacture of cans and bottles. Our homes are protected with optically inspected locks and keys, and parts of home heat regulating systems are optically inspected. We drive cars which are better due to projection inspection. And whether we choose to write with

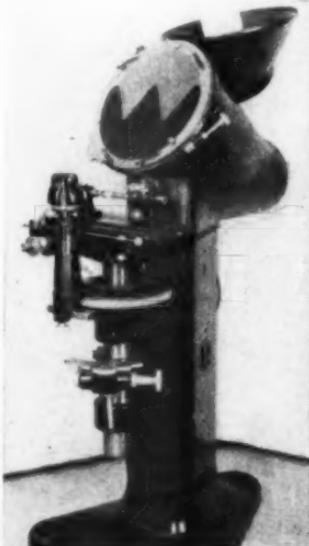


Fig. 1—Set-up for inspecting a 10-pitch American National Form tap. Measurements are taken to determine how far the pitch diameter, root diameter, lead, etc., vary from the ideal and flank angles are measured as well. Many other parts are inspected with the same speed and accuracy as are screw threads.

bettering these processes. Even our clothes are made better because certain important parts of textile machines are inspected by projection. Such a list as this could be extended indefinitely.

The textile industry is one of the numerous industries in which large numbers of different parts with complicated contours are inspected quickly and accurately by projection. The adding machine and cash register industries are others, where many varieties of parts with complicated contours, are inspected without need of large numbers of single purpose inspection and measuring devices.

Another interesting application of projection is the inspection of taper threads. Chasers for taps, dies, solid taps, gages, thread hobs, etc., also the work produced by such tools, are readily checked for form, lead, and taper.

Two types of charts are used. A chart with a single outline may be used for checking taper, form and spacing from tooth to tooth, or over the entire length of the threaded section. In such cases, lead is checked with spacing blocks used in conjunction with a micrometer, or with a micrometer only. Taper is checked with the elevating wheel.

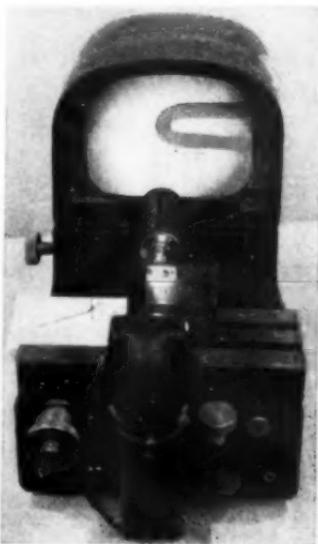


Fig. 2—Set-up for inspecting knitting needles. An average operator inspects 1200 to 1500 needles per hour. Projection tells at once whether a given piece measures up to standard, and if not, where it is imperfect. Some parts are so complicated and so unusual in shape that projection offers the only practical method of inspection.

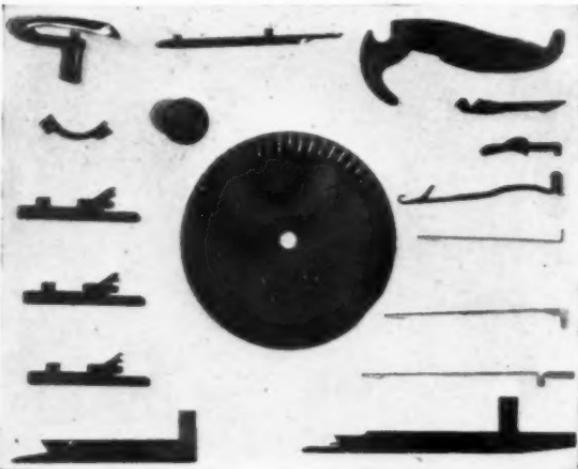


Fig. 3—A group of knitting needles, jacks, sinkers and other parts used on textile machines. Projection is employed for inspecting all of these parts.

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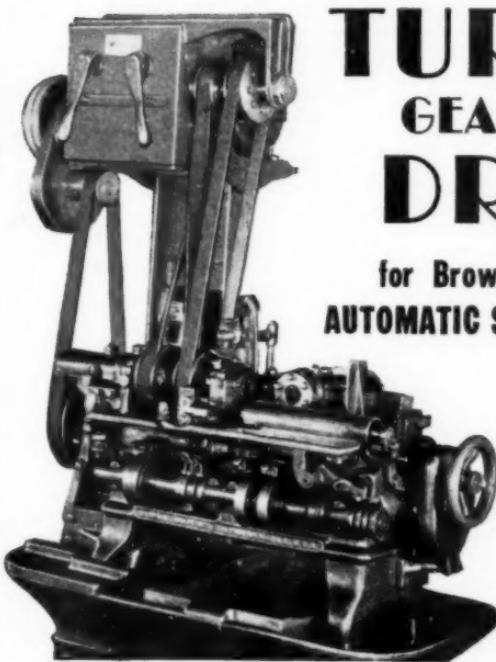
The second kind of charts has double outlines as shown in Figure 6. These are used frequently when it is desired to check duplicate parts to obtain a complete knowledge of all the elements (form, lead, and taper) in the quickest manner. Such charts are provided with two thread outlines varying in vertical position by the amount of half the included taper over the distance desired to check. The chart shown in Figure 6 is drawn to check the taper in 1 inch of thread length. The pipe chaser is placed before the lens so that the shadow of the first full tooth coincides with the lower outline on the chart. The table is then advanced sufficiently to insert a 1 inch size block between the table anvil and the micrometer. The shadow of a tooth, spaced 1 inch from the first projected, should now coincide with the

upper outline on the chart.

In concluding this series of articles, it is well again to mention that the extreme precision of projection inspection plays an important part in the manufacture and assembly of products. To keep manufacturing costs at a minimum, the tolerances on manufactured parts must be as liberal as practical. Therefore, the more efficient the system used for gaging the accuracy of tools and product, the larger will be the tolerance remaining for tool wear, etc. In many instances, objects can be inspected by projection with greater ease and a much higher degree of accuracy than with mechanical gages. If parts can be inspected more closely to the limits of their tolerances, manufacturing costs go down and better fits are assured. The greater accuracy of projection inspection makes it possible



Fig. 4—A group of representative cash register parts, together with the small bench type projection comparator with which they are inspected. For general inspection purposes, a projection comparator is a fairly complete gaging system in itself. With a few staging fixtures of simple design, numerous parts of many different shapes may be tested with ease and accuracy. Dozens of elaborate single purpose gaging fixtures are eliminated. When projection inspection is used, products can be re-designed without consideration as to whether it will be necessary to scrap expensive inspection equipment and measuring devices.



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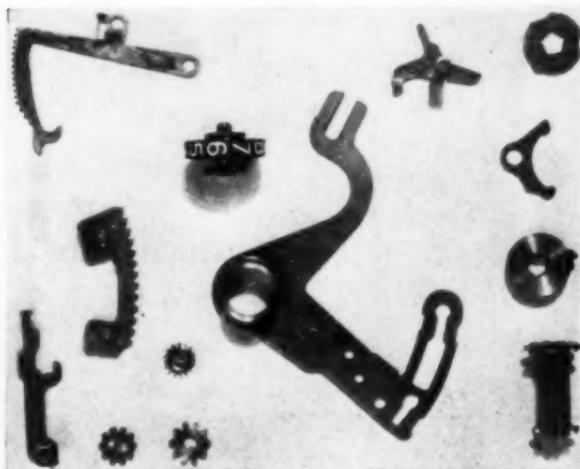
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PATENTS PENDING

Fig. 5—Some adding machine parts that are inspected by projection. In the upper central part of the illustration, note the small wheel with numerals around the circumference. These numerals are inspected by reflection, as described in the second article of this series.



to see just how nearly a part approaches its maximum tolerances. At the same time, the tool used in machining a given part can be set to machine the part to its minimum size. As the tool wears, the part being machined will approach the maximum tolerance and the maximum number of pieces will have been machined before it is necessary to reground the tool and again set it to cut the minimum size. In this way, optical inspection

insures a maximum number of acceptable parts with a minimum amount of tool setting and inspection.

The accuracy of the outline which can be cast by a projection comparator never varies, no matter how long the machine has been used, or how many millions of pieces have been inspected. Because the heart of any projection comparator consists of a lens system and a beam of light, in which there are no moving parts to wear.

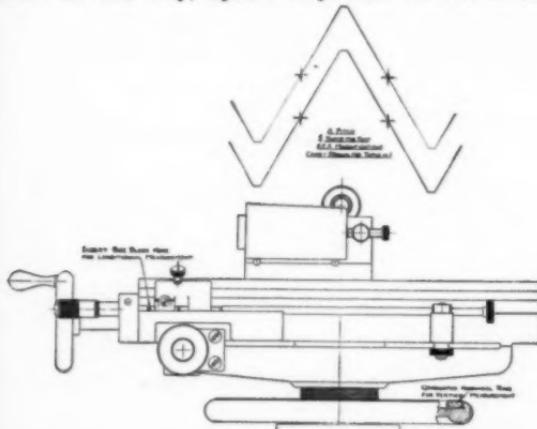


Fig. 6 — Taper pipe chaser mounted in projector stage for inspection.



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Streamlining By Welding

**Welded Construction Gives Improved Appearance
and Lowers Production Cost**

By EDWIN O. MARTINSON*

A HAND-OPERATED torsion testing machine of 10,000 inch-pound capacity recently was redesigned and modernized for greater sales appeal. It serves as a good example of the advantages of welded design for this type of product.

The main considerations in the redesign were to retain the former accuracy of the machine, to improve its appearance, to decrease weight, and to reduce the effort required to operate the machine.

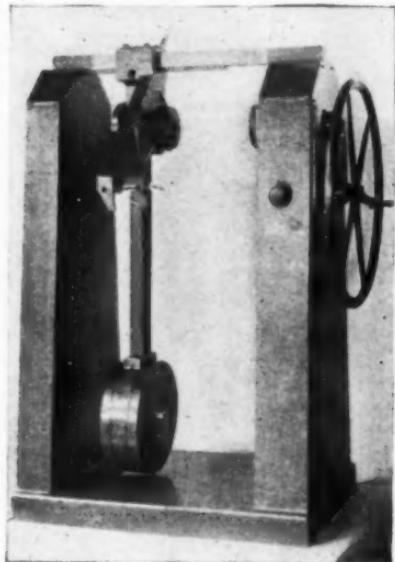


Fig. 1 The new torsion testing machine — a striking example of design improvement through welding.

The unit is intended for schools and colleges, demonstration purposes, and light industrial work, and being hand-operated, must sell for as low a price as possible for an accurate instrument. Therefore, it was important to reduce the manufacturing cost as much as possible without impairing any of its former features. The use of a welded frame fulfilled these objectives.

The most pronounced effect of welded design was the improvement in appearance. (Compare Figs. 1 and 2). The general lines of the machine were made to correspond to those of other testing machines manufactured by the Company. The effect obtained is one of simplicity and ruggedness by employing massive looking members with smooth flat surfaces and a minimum of exposed working parts.

There was no difficulty in achieving this characteristic appearance with rolled structural channel sections, cut and bent to the proper shape, and light weight steel plates.

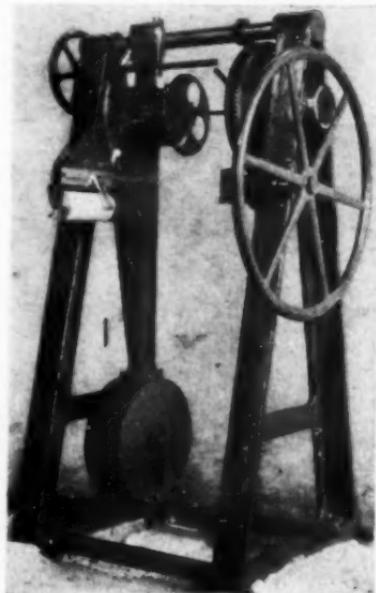
A $\frac{3}{8}$ " thick plate formed a floor plate heavy enough to withstand abuse from falling objects without denting. Sheared $\frac{1}{8}$ " thick plates closed the vertical channel members except where the bushings for the main drive trunnion were located, at which point $\frac{3}{4}$ " plates were used. All plates were cut slightly smaller than the outline formed by the channel members. Welds were $\frac{1}{8}$ " fillet welds for the light plate and $\frac{1}{4}$ " fillet welds for the heavier plate, all made with shielded arc electrodes. Intermittent welds were used as much as possible to reduce the welding time and distortion. Bosses cut

*Mechanical Design Engineer, American Machine and Metals, Inc., East Moline, Ill.

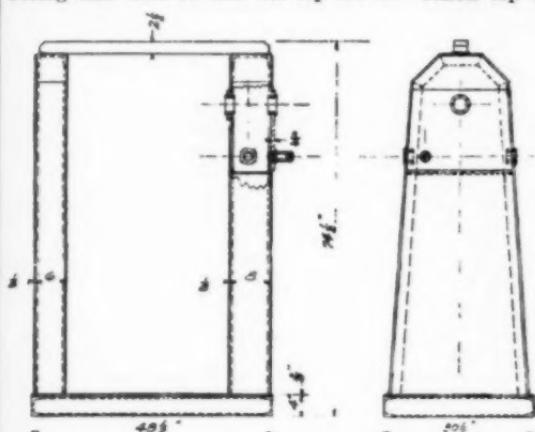
from hot-rolled rounds were welded to the frame where necessary for bronze and oilless bushings. No bosses were required for the drive trunnion as the bronze bushings were pressed directly into bored holes in the $\frac{3}{4}$ " plates. Fig. 3 shows the simplicity of this type of construction.

The accuracy of the pendulum type of torsion testing machine depends to a large degree, upon its ability to keep the load indicating bar and scale on the pendulum bracket in a horizontal position, with changes in applied torque and with movement of the bracket along the top bar in accommodating various lengths of specimens. A $2\frac{1}{2}$ " square cold-rolled steel bar was found to be most suitable for this top bar because of its low cost and satisfactory tolerances, as to straightness, squareness, and uniformity of width. To reduce the possibility of twisting or bending this bar, it was welded with light fillet welds as the last welding operation. Neither bar nor frame were machined at the points of attachment. No annealing of the frame was required after welding.

All machining on the frame was performed on a horizontal boring mill at one set-up after welding was completed. The frame was clamped to the boring mill table so that the top bar of



the frame was exactly parallel to the spindle of the boring mill. Then the positions of the trunnion and counter-shaft bores were laid out from the cold-rolled top bar. Bushings pressed into



Figures 2 and 3—Above is the old cast iron frame torsion testing machine. The use of modern welding technique improved appearance of the machine, saved weight, provided increased strength and rigidity—and lowered production cost.

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these bores made inexpensive and accurate bearings. These accurately located bearings reduced the assembly time and assured correct meshing of the worm and bevel gears of the drive mechanism.

After machining, a pyroxylin iron filler, applied with a putty knife and then sanded smooth, covered the fillet welds and the intermittent spaces between them, resulting in smooth rounded corners. One coat of gray pyroxylin lacquer gave an excellent finish of high luster. It can be noted in Fig. 1 that in spite of the tendency of photographs to emphasize flaws in finish, the frame has the appearance of a continuous piece of metal with smooth contours and edges.

The saving in cost proved to be more than expected. A comparison of costs of the old and new designs as taken from the actual manufacturing cost records is as follows:

Manufacturing cost of frame only:

	Material	Labor and Burden	Total
Welded Frame	\$37.02	Fabricate & Weld \$41.10 Machining 28.60 Fill and Paint 7.45 Total labor and Burden 77.15	\$114.17
Cast Iron Frame	\$72.61	Machining 56.39 Fill and Paint 15.15 Extra Assembly 9.38 Total labor and Burden 80.92	\$153.53

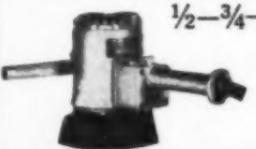
This represents a saving in manufacturing cost of the frame of \$39.36 which is 25% less than the cost of the former cast iron frame. The saving would have been greater if the cost of patterns had been taken into account. The cost of the welded frame was for the first machine of the new type which was built. It was fabricated without the use of templates or welding fixtures.

The welded frame was approximately 30% lighter in weight than the cast frame, even though it is of more rigid and massive construction. The new frame weighed approximately 700 pounds compared with about 1000 pounds for the old frame.

Operating experience with the machine met all expectations. A pleasing, modern design was achieved by welding. Assembly, machining, and material costs were lowered, and a substantial saving in weight was obtained. The modernization of this torsion testing machine is typical of the possibilities of the use of arc welding in the manufacture of testing machines and similar applications.

Brief of Award Paper from The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

CUTS GRINDING COSTS



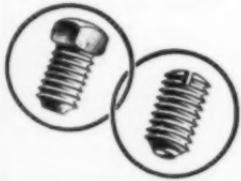
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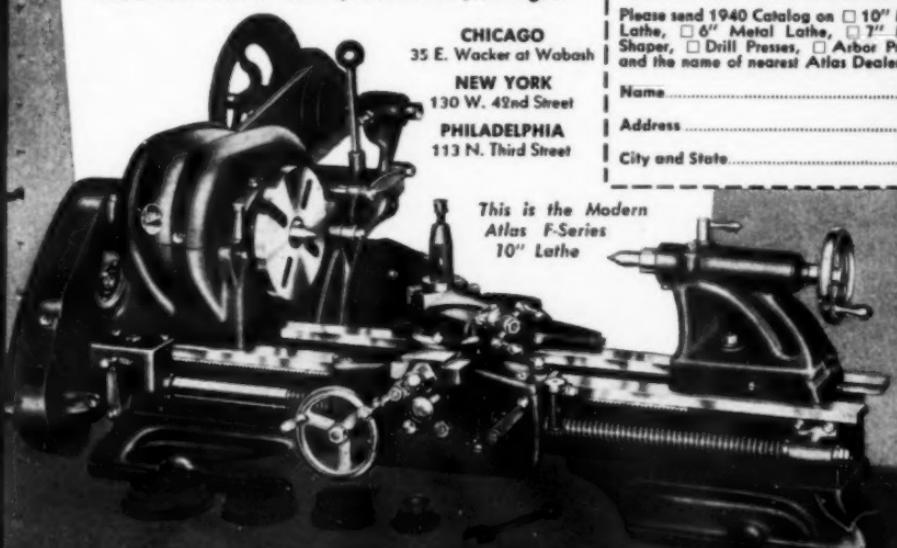
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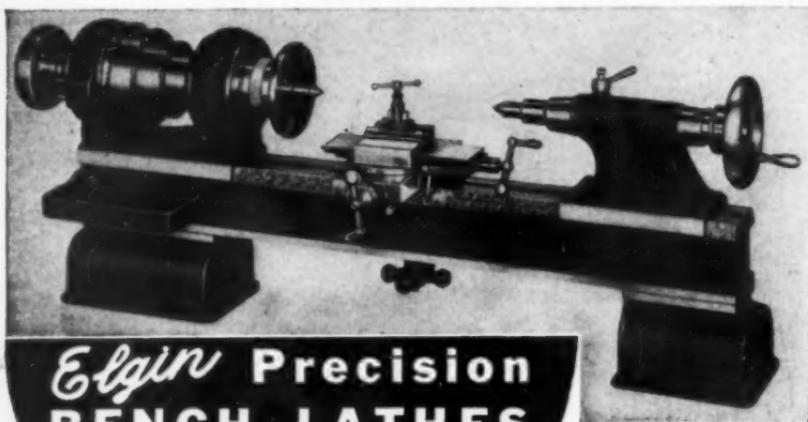
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Piercing Punches

A Logical Explanation of How and Why Punches Fail

By J. A. SMITH,

Durable Punch & Die Co., Chicago

AS manufacturers of the Durable patent piercing punch, we specialize in the piercing of holes in material thicker than the diameter of the punches, and this has given us experience with piercing punches, impossible to obtain in any other way.

Ordinarily a die is built with the piercing punches mounted and put in the press for running. If the punches stand up, it is a good job. If the punches break, the usual alibi is that they were too hard, too soft, the material was defective, the press out of line, the operator careless—in fact anything but the one thing which our experience leads us to believe is the fundamental cause of most punch breakage, provided the die is properly constructed. We base this statement upon an accidental discovery which occurred in this manner:

First, with our patented sleeves supporting the punch, we experimented with various steels to determine which gave the best results under identical

conditions, such as heat treatment, Rockwell hardness, and using these on the same kind of material. We found that to a certain extent, punch life increased with the hardness, due to increased resistance to abrasion. However, beyond 65 Rockwell there was little to be gained from hardness alone.

Next we figured that vertical lapping would remove the circular grinding lines, and with special equipment using stones for lapping, we put a superfinish on the working end of the punch. Punches made in this way were supplied to a number of our customers, and were reported to be far superior to anything they had ever used. We felt that we had succeeded in accomplishing something worthwhile, so the next step was to prove it under actual comparative conditions.

We naturally assumed that a punch, made glass-smooth, would cut a hole with a smoother wall than a punch ground in the ordinary way, so we built a die with two holes $7/32"$ in diameter



to punch $\frac{1}{4}$ " thick material. One of the punches was ground standard, the other was vertically lapped.

Remember, we were not checking for punch life, but for the comparative walls in the holes. The first pair of holes blanked showed the ground punch making holes with the walls scored, while the vertically lapped punch pierced a smooth hole. After piercing half a dozen holes, lines also began to appear in the holes made by the vertically lapped punch. So the die was taken out of the press for punch examination. Under a microscope, we found minute particles the size of pin heads or less, welded to the punches. Different degrees of Rockwell hardness and different steels all showed the same condition. This forced upon us the fact that piercing punches start to break down as soon as they are put into use. With the thought in mind that a harder face might help, various compound hardenings were tried but without any improvement. Against the advice of many who said they had tried it, we had a hard coat of chrome, about .0001" thick, deposited on the superfinished punches.

The results were remarkable. Using the same material on which a regular punch would pierce only four or five holes before showing pit marks, the chrome plated punches ran 2500 holes with no evident signs of usage.

We next tried the chrome on standard ground punches without the lapped finish, but they would pick up and "gall" or "fire" as soon as the regular ground or the lapped punches without chrome.

Checking under the microscope to find the reason for the difference in performance between the lapped and ground punches, we discovered that on the latter, the grinding left grooves not visible to the naked eye. Evidently, the high points of these ridges break off or wear off in operation, leaving the bare punch metal exposed to "galling" or "firing" the same as if no chrome had been deposited. When these ridges or high spots are removed by vertical lapping, a smooth, uniform face is provided for the chrome deposit,

undoubtedly accounting for the increased life of the superfinished chrome plated punches.

Now for the answer. The laboratory reported that chrome, which has a 29% lower coefficient of friction than steel, reduced the heat generation, which stopped the welding of the small particles to the punch. This was fine in theory, but we figured we should be able to prove this in the shop. We set up the die with the two holes, having mounted regular punches, and pierced as many holes as possible in half the length of a piece of $\frac{1}{4} \times \frac{3}{4}$ " steel. When piercing these holes, the oil used as a lubricant would smoke, and the pierced slug was so hot it could not be caught without burning the bare hand. The die was now changed, the lapped chrome plated punches mounted, and the other half of the same bar pierced. The oil did not smoke and the slugs could be caught as they were not uncomfortably warm.

As a further check on this situation, one of our local customers is punching a $\frac{3}{16}$ " hole through a $7\frac{1}{16}$ " square bar of mild steel, which is a fairly difficult job. The job was set up as a favor, and only a few hundred run with the chrome plated punch. The operator, who knew nothing about the chrome plated punch, turned to his foreman and remarked that the material he was running was a fine lot of soft material. He could tell the difference in operation, but did not know the reason, and could only attribute it to the material.

Others report similar results. One user asserts that on a job which formerly averaged 12,000 holes per punch, they now average 75,000. Another reports that $40,000 - \frac{1}{4}$ " holes through $5/16$ " material is no longer an exception. Some are now having us make their standard punches, due to the increase in efficiency. While we would be the last to say that this is the final improvement in piercing, the improved performance of these punches makes us feel proud of our accidental discovery, which will satisfy us until we stumble onto something better.

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Before Carl Edvard Johansson developed his gages, the world had fine watches, automobiles, machines and instruments. But it had them only in thousands. It required too long to manufacture them. Today the world has these things in scores of millions.

When the first set of blocks was made, it was accurate within one ten-thousandth of an inch. Later the accuracy was increased to fifty-millionths inch, then ten millionths inch.

Shortly after Ford acquired the gage blocks, this accuracy was increased to eight, four and finally two millionths of an inch. Ford automobiles, for example, have 186 points of contact in which tolerances less than five 10,000ths of an inch are required.



Verifying the accuracy of a "Go" and "No Go" snap gage.



Checking width of spline gage with Johansson Gage Blocks and Jaws in an adjustable holder.

Aside from actual development of the gage blocks, Johansson provided a universal standard of measurement. Obviously there may be wide temperature variations between place of manufacture and place of use. This entails a serious manufacturing problem because heat expands metals. Manufacturers must consider this phenomena—otherwise parts made in northern tem-

peratures would not fit in the tropics.

Johansson met this by deciding to manufacture his gages in a temperature of 68 degrees and then working out calculative adjustments which made them applicable to manufacture in any temperature.

His second problem was the conflict between English and metric systems of measurements. After Johansson finally persuaded the industrial world to agree on an international adjusting temperature, he next achieved international acceptance of 25.4 millimeters and one-inch as equal lengths, for all practical purposes, and thus made his gage blocks convertible from one system to another.



Checking spacing of spline gage with a combination of Johansson Gage Blocks.

The blocks are rectangular pieces of tool steel, hardened, ground, stabilized and finished to an accuracy of one, two, four or eight millionths part of an inch, according to requirements.

To meet such exacting requirements, Johansson perfected a special steel, in which when finished, all internal stress and strain is relieved. In a way, the molecules may be said to be at rest or in equilibrium, and warping or growing



Verifying the accuracy of a "Go" and "No Go" snap gage.

is definitely checked.

The next problem was to approximate the absolute in attaining flat surfaces in steel. Two absolutely flat surfaces if placed together will exclude all light.

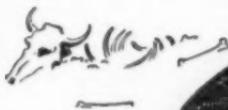
Johansson produced flat surfaces, with an extremely high finish, having the appearance of burnished silver.

These flat surfaces when thoroughly cleaned and slid, one on the other, with a slight inward pressure, take hold as if magnetized. "Atmospheric pressure", "molecular attraction" and capillary action of a minute film of oil on the surfaces have been offered as explanations of this phenomenon. Possibly it is a combination of all three, but certainly the result is surprising. In a demonstration before the Stockholm Technical Institute in 1917 Johansson "wrung" two blocks together, the sizes of the two surfaces in contact being approximately one-half a square inch—and the contact sustained a weight of 220 pounds. This weight was more than 30 times the atmospheric pressure present during the demonstration.

The full story of Johansson's accomplishments is given in a booklet—"He Measures In Millionths," a copy of which may be had by addressing the Ford Motor Co., Johansson Division, Dearborn, Mich.

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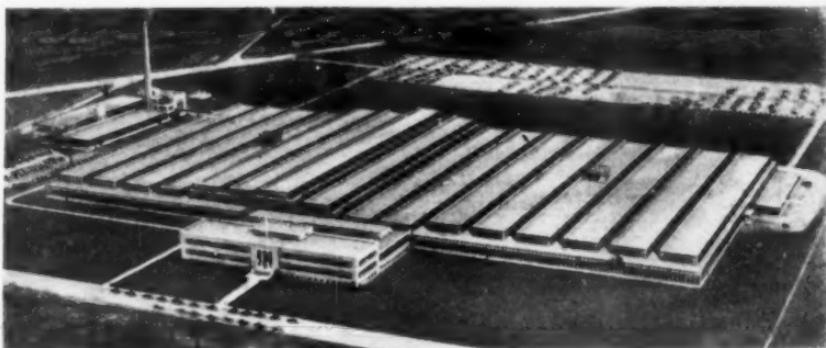
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Pratt & Whitney's New Plant

AFTER occupying a gradually increasing group of buildings for 79 consecutive years, Pratt & Whitney have abandoned the old quarters for a new plant in a new location, designed specifically for their own use. This is rather a unique procedure for a Company manufacturing precision machine tools, small tools and gages.

The old plant comprised 23 multi-story buildings and presented an increasingly serious problem in the handling of heavier and heavier castings involved in modern machine tool production.

The new plant is all in one building, 1000 feet long and 550 feet wide and parts will have to move only a few feet from one job to the next.

Castings come into the new plant by truck or rail. From the unloading dock at the rear, there are complete crane and handling facilities for moving heavy parts with a minimum of effort and time.

Cleaning, filling and painting facilities are adjacent. Then it is only a step to the machining and planing floors, where the larger pieces receive their initial machining. Then it is but a few feet farther to the assembling floors. Similarly through other

sections, small parts travel progressively from one job to the next until they arrive finished in the assembly section. Production is streamlined from one end of the big plant to the other.

When a machine is finished, a big crane moves it a short distance to the shipping floor where it is boxed and moved on to a truck or a railroad car. There is none of the former moving heavy loads upstairs and down.

Small tools and gages move smoothly along from one operation to the next, arriving finally in the stock room. A separate shipping room is provided for these small parts.

Plating departments, hardening rooms and constant temperature rooms are located at strategic points, so there is little lost motion from start to finish.

All of these operations were planned in advance in laying out the new plant. The result is a smooth-running manufacturing layout which cuts overhead and handling costs.

Vast improvements have been made in the working conditions for the men. There is ample light and ventilation. Modern conveniences maintain physical comfort at a high level. There's no backbreaking drudgery because me-

This Jig Borer was the first machine to be completed and shipped from the new plant.

chanical and electrical lifting devices have eliminated all that. There's a fine cafeteria and an excellent first aid station. Every safeguard has been built into the machines and equipment. Masks and goggles are provided to prevent eye and lung injuries.

The new plant is located in Charter Oak Park, West Hartford. It is of modern steel and glass "daylight" construction, fireproof and with a heavily insulated roof. A decidedly impressive feature is the amount of glass used to assure adequate lighting. This glass, which has a total area of about seven acres, was made by the flatdrawn process used for automobile safety glass.



Most of the factory floor is of creosoted wood blocks, laid on edge in tar, on a concrete base. Three million of these blocks were used. One section is covered with wood strip flooring (natural wood blocks laid on edge with-



A Keller Automatic Tool Room Machine in the process of assembly. The reinforced concrete floor in this section of the new plant is two feet thick.

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The name WYCO stands for QUALITY in the flexible shaft field, representing the best in construction and design.

Two typical examples are shown—the Series 5 Heavy Duty Grinder Machines in Roll Easy Truck Base (ST), and Suspension Type (SS).

The motor is a 1½ H.P., 3 phase, 60 cycle, 220/440 volts with 3 phase toggle switch, 4 wire cord and grounded attachment plug, with speed of 3400 R.P.M. The WYCO Non-Metallic Inner Liner patented flexible shaft is 7 ft. long, with finest quality $\frac{3}{8}$ " diameter inner core.

Equipment includes: precision ball bearing handpiece, wheel arbor, 8"x $1\frac{1}{4}$ " grinding wheel (resinoid bond) and wheel guard with outboard handle.

Write
for
more
information.



When sending for details on the Heavy Duty Grinder, ask for our new 28 page catalog. Sent free.

WYZENBEEK & STAFF, INC.

836-838 W. HUBBARD ST.

CHICAGO, ILLINOIS



Looking across the new plant, with the big planer floor in the foreground.

out tar) and will be devoted to fine bench work on gages.

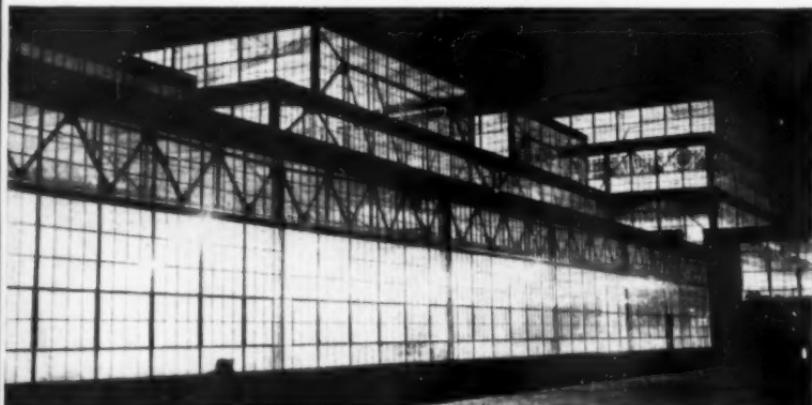
In the heavy machine assembly section, the floor is of solid concrete, two feet thick.

The administration building is of concrete, floored with composition tile laid on concrete.

The plant is heated by 152-steam-operated unit heaters and blowers. Three 400 h. p., oil-fired boilers, supplying steam at 200 lbs. pressure, are used for heating only.

Electricity is purchased. The initial voltage of 11,000 is reduced by four transformer stations in the plant to 220 volts, and by separate transformers to 110 volts for lighting.

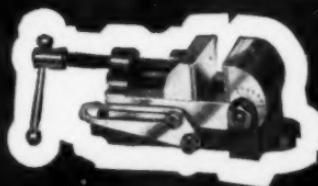
Equipment is arranged so that at a future date, it can be changed over from 220 volts two phase, to 440 volts three phase for power purposes. It is estimated that the total occupied load will be 7500 kw., with a maximum demand load of 2600 kw., and an average load of 2000 kw.



A striking night view of the new plant with its modern G-E lighting, which shows brilliantly through the 110,000 panes of glass.

PALMGREN ANGLE VISE

ANGLE VISE
with
SWIVEL BASE



TOUGH ANGLE JOBS ARE EASY
with PALMGREN Angle Vis

Angle jobs set up quickly without the use
of clamps, wedges or other makeshift methods.

For production or tool room work. For drilling,
milling, grinding, it's graduated. Furnished with
or without graduated swivel base.

ORDER FROM YOUR SUPPLY HOUSE OR WRITE US

CHICAGO TOOL & ENGINEERING CO
8364 SOUTH CHICAGO AVE. CHICAGO, ILLINOI

*Two New
Awards*



Two new certificates of award in the 1939 Modern Plas-

ties competition have been presented to the George Gorton Machine Company for the part its machines contributed to the production of outstanding plastic applications. Fifteen leaders in this contest, receiving more than thirty-five awards, are owners and users of Gorton die and mold equipment.

Let us help you cut production costs and production time; tell us your problems.

FOR COMPLETE INFORMATION, WRITE TODAY!



GEORGE GORTON MACHINE CO.

1115 13TH STREET, RACINE, WISCONSIN, U.S.A.

FREE TRIAL
of a **SAFETY TOOL**
guaranteed to save
its cost in
labor every
six months
on your Drill Press



READ THIS GUARANTEE!!

We guarantee that the combination Drill Table and Vise will save its cost in six months' time on labor alone. If, after 30 days' trial, you are not convinced of this, you may return the Combination to us at our expense. There are no strings attached to this guarantee in any way. We put the Combination in your shop, let you try it, and after thirty days' time a decision is entirely up to you as to whether you wish to keep it or not. If you decide to return it, you may ship it back, transportation charges collect.

Let us know which size you wish, and we will ship a Combination to you on trial at our expense.

Write TODAY to



**MODERN MACHINE TOOL CO., JACKSON,
MICHIGAN**

1800°F. with JOHNSON No. 101 Bench Furnace

No
Blower
Needed



Powerful, efficient, economical for soldering coppers to 12 lbs. per pair; for heat-treating, tempering, annealing, case-hardening tools. Patented Johnson hood forces return blast. Heavily lined with refractory. Has 2 Johnson burners, shut-off valve and pilot light.

No. 650 Heat-Treating Furnace

Produces 1800°F.
with 6 Powerful
Johnson Burners.

NO MOTOR NO BLOWER

For tempering, case-hardening, pack-hardening, annealing, etc. Heat-treats any carbon steel. Use muffle when heating small and polished steels; carbon steels may be subjected to direct flame. No oxidation.

Write for New Johnson Catalog

Johnson Gas Appliance Co.

CEDAR RAPIDS, IOWA
524 E. Ave. N. W. ESTABLISHED 1901



Distance between columns is 22"; clearance between platen and top strain head is 17½". To accommodate various size dies, the strain head is adjustable for 12" permitting a maximum daylight space of 29½". The platen stroke is 8". Provision is made for the application of ejector pins or a separate ejector cylinder.

A unique power stroke makes the press particularly suited for compression molding of thermosetting plastics. The pressure is developed through a combination lever and toggle mechanism developed specially for this kind of work. The platen advances rapidly but decelerates when the dies begin to close, allowing time for the compound to soften. Smoother and denser products are the result. The rate of up-travel and the return speed are both adjustable to suit the application. An important feature is that full tonnage is applied to break the mold when reversing the cylinder.

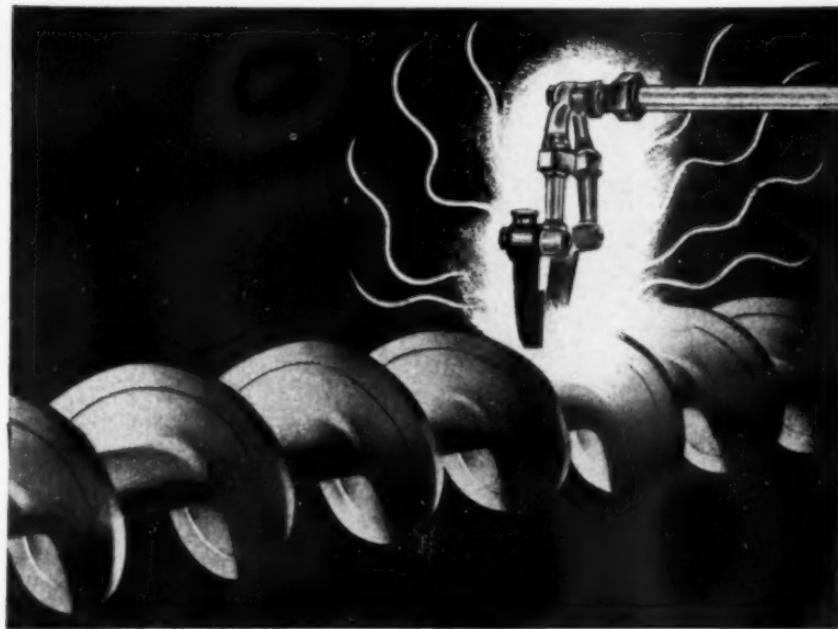
If air is not available, this same press can be furnished with a completely self-contained hydraulic power unit at small additional cost. A variable delivery oil pump is used to maintain pressure during the cure and only a 2 h. p. motor is required.

A similar press is available in a 15 ton capacity and also complete hydraulic presses for compression molding up to 300 tons capacity and higher.

Precision Disc Grinding

The possibilities in disc grinding, in the way of precision and high production rates are presented in a new booklet offered by Gardner Machine Co., 436 E. Gardner St., Beloit, Wis.

One of the examples cited is a typical job on a big No. 84 - 30" Gardner grinder, with 5-7/8" diameter spindles, which turns out roller bearing races ground on both faces at the rate of 60 to 70 per minute. The races are held within .0003" to .0005" for parallelism and .004" for uniformity. The races are fed between the opposed grinding members by means of a special rubber roll feed fixture.



LENGTHENING THE LIFE OF EXPENDABLE PARTS

The replacement of expendable parts has a persistent way of blocking the path to mine operating economy. By the same token, it offers a great opportunity for cost reductions.

For example: a mine was having plenty of trouble with conveyor screws for handling cinnabar. Requisitions for replacements were coming along all too frequently.

Chromium-Molybdenum cast steel screws solved that problem. A simple preliminary heat treatment gives the screws

strength and toughness to withstand heavy pressure and impact loads. Flame hardening the flights to 630 BHN gives them the ability to stand up for long periods under the severely abrasive action of the ore.

The records show that the Chrome-Moly screws last three times as long as others previously used which were actually higher in cost.

Recheck your own parts specifications and send for free technical book, "Molybdenum in Steel."

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Molybdenum Company
500 Fifth Avenue, New York City

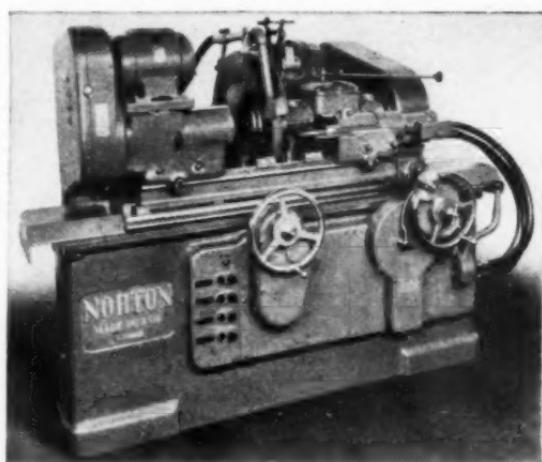
Norton 10" Type C and 12" Multipurpose Grinders

Numerous refinements are offered by the new line of 10" Type "C" grinders presented by the Norton Co., Worcester, Mass.

Highlights include an entirely new base, of which oil and coolant reservoirs are an integral part. Oil and coolant pumps are vertically suspended on springs and run submerged. Motor starting equipment is isolated in a cored receptacle at rear. Wheelside and table ways are pressure lubricated from a separate system, permitting the use of oils of different viscosities for strictly lubricating purposes, and as the hydraulic fluid for operation of the various units so controlled.

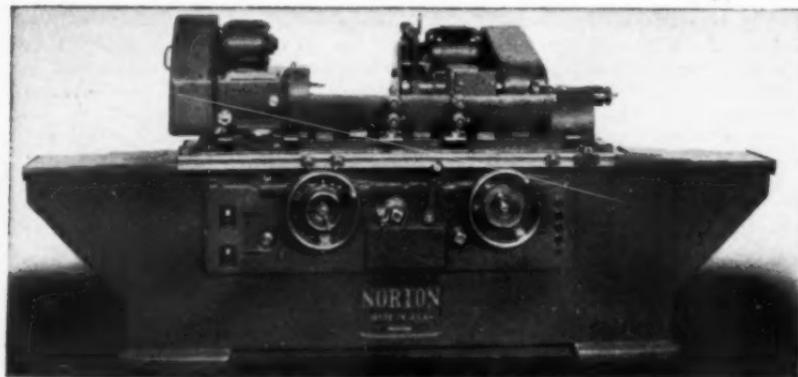
Headstock has been redesigned and is driven by V-belts and a silent chain. Footstock has also been changed. Large spindles and centers assure rigid support and contribute to the betterment of surface finishes.

These machines are available with hand, hydraulic or mechanical traverse of the table. A semi-automatic model



can be arranged for hand or hydraulic table traverse. In addition, semi-automatic machines are usually equipped with hydraulically operated footstock and headstock. Often, hydraulically operated steadyrest is also supplied. These are plunge-cut machines and parts are ground with the operator simply placing the work between centers and moving a single lever.

The 12" universal unit, shown at bot-



tom of the page, is entirely new and it is known as the Type "LC" Multi-purpose. It performs external and internal grinding operations with equal facility.

Table can be propelled hydraulically, or by hand through a two-speed arrangement, making it possible to move the table quickly into position, or more slowly for operations such as shoulder grinding. When power traverse is engaged, hand traverse is disengaged and vice versa.

Two ranges of feed are provided, selected by a single knob. Each hole in the index is equivalent to a work diameter reduction of 0.0004" in the fast range, and 0.0001" in the slow range. An electric dwell control is supplied for the hydraulic traverse mechanism.

Headstock is of the universal type, driven by a $\frac{1}{2}$ h. p. constant speed a.c., or variable speed d.c. motor. Cone type V-pulleys provide four work speeds, from 65 to 260 r.p.m., with the a.c. motor.

Live spindle and dead center operations can be performed, controlled by a knob on front of head stock. Base is graduated and can be set at any angle either side of zero. Bearings are pressure lubricated.

Wheel slide can be swiveled to any angle, and fed at such angle, or it may be set at any angle and fed perpendicularly to the table ways.

Releasing a single binding screw permits moving wheel unit proper, backward or forward, increasing distance between wheel and work centers by as much as 6" if desired.

The machine swings 12" and is built in 24", 36", 48" and 72" lengths.

Bulletins fully describing both machines will be mailed on request.

Ajax Coupling Grows

Construction has just been completed on a new addition to the factory of the Ajax Flexible Coupling Co., Westfield, N. Y. This addition will house their enlarged electric welding and assembly departments for fabrication of Ajax vibrating screens, conveyors and packers.



REPAIR CONCRETE to a TOUGH Feather Edge!

RUGGEDWEAR RESURFACER, made with cellulose, may be used for patching concrete or over an entire area . . . indoors or out. Stands up under the heaviest floor traffic. No chopping or chipping required. Merely sweep out the spot to be repaired—mix the material—trowel it on. Holds solid and tight right up to the irregular edge of the old concrete . . . leaves no joint or crevice to become chipped or filled with dirt. Provides a firmer, tougher, smoother, more rugged wearing surface. Dries fast. Costs only 10c

to 14c per square foot.
RUGGEDWEAR is the only Resurfacer made with cellulose. Valuable, 60 page "HANDBOOK of BUILDING MAINTENANCE" sent FREE to those requesting on business letterhead.



MAKE THIS TEST!

FLEXROCK COMPANY
2305 Manning St.
Philadelphia, Penna.

Please send me complete RUGGEDWEAR information . . . details of FREE TRIAL OFFER—no obligation.

Name _____

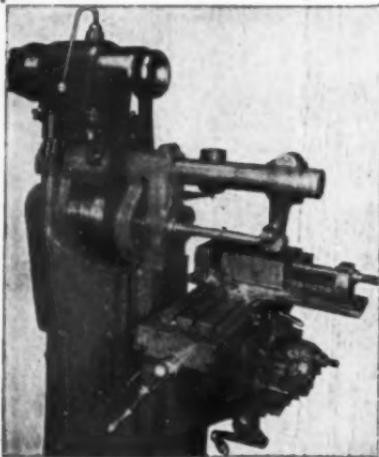
Company _____

Address _____

City _____ State _____

New

LIMA GEARSHIFT MOTOR



FEATURES

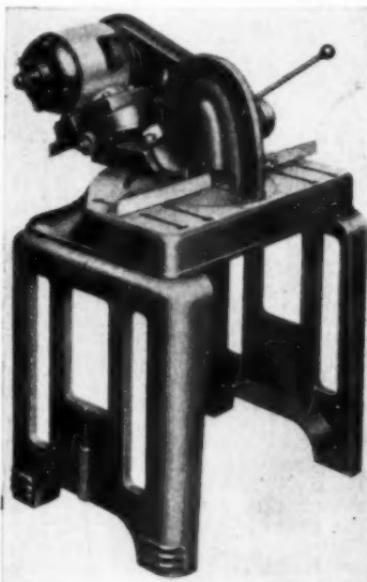
Eliminates countershafts . . .
4 speed automotive transmission . . . All steel, heat-treated gears run in bath of oil . . . Hand wheel rotation of machine spindle . . . Instant reversability with all speeds . . . Designed for 1800, 1200 and 900 r.p.m. motors, either single or two speed . . . Adaptable for flat or "V" belt . . . Easily installed.

Write for complete information.

LIMA
ARMATURE WORKS, INC.
440 N. MAIN ST. LIMA, OHIO

A Delta Cut-Off Machine

An accurate, speedy abrasive cut-off machine, said to be built according to sound engineering practices, embodying important improvements and selling at a low price is announced by the Delta Mfg. Co., 603 E. Vienna Ave.,



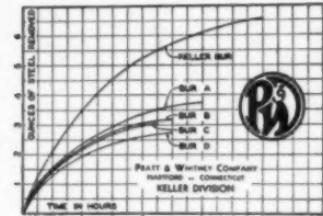
Milwaukee. It is asserted to cut quickly and accurately to exact lengths, such materials as steel, brass, copper, cast iron, monel metal, bakelite and all plastic materials, pipe, wire rope, stellite, tool steel, manganese steel, fibrous material such as brake linings, tile, brick, carbon, porcelain, slate, hard rubber, concrete coping and sand cores. On metal it leaves the cut with a polished surface, thus eliminating many burring and finishing operations necessary where other cut-off methods are used. By switching to a saw blade, this same unit can be used for cutting wood.

Some of the outstanding features are:—wide-spaced Timken roller pivot

This test was made on a special machine designed to duplicate the actual conditions under which a bar would be used. A Keller No. 1 coarse cut high speed steel bur was used, selected at random from our large stock. The material cut was 10115 tool steel.



10½ OUNCES of tough tool steel ...with ONE KELLER BUR



Here is the result of a test of medium cut burs that we made on the same machine. All conditions were the same for the Keller Burs and each of the four other prominent makes. Each line indicates an average of five burs tested.

... and still that bur had cutting qualities! There's no secret to the stamina and endurance of Keller Burs. The best of steel—up-to-the-minute manufacturing equipment—Pratt & Whitney precision craftsmanship . . . the combination tells the whole story.

Keller Burs are available in all sizes, shapes, and cuts. There are mill-cut burs for soft metals and hand-cut burs for the harder materials—burs of every conceivable shape and size, designed to fit the exact contours of your work—burs that will reach otherwise inaccessible corners—burs for all kinds of grooves and angles. Catalog No. S-451 describes in detail more than 300 Standard Keller Burs that are carried in stock ready for immediate shipment. Write today for a copy and see for yourself why Pratt & Whitney is known the world over as—**Headquarters for the Finest of Flexible Shaft Equipment.**

PRATT & WHITNEY

DIVISION NILES-BEMENT-POND CO.

• HARTFORD, CONN.

■ Kellerflex Sales Department ■

bearings and double arbor sealed-for-life bearings requiring no lubrication—Tex-Rope V-Belt drive—adjustable fence—accurately machined table. It is accurately balanced for easy operation—cuts material at any angle and embodies unusual safety features such as husky chip guard, belt and wheel guards. It has a capacity up to 2" diameter, or material up to 2"x6".

**Special Anti-Mushrooming
Anti-Chipping Heat-treat**

Oversize Shanks ▶

Exclusive

Knurled Back ▶

Exclusive

Thumb Grip ▶

Broach-

Rounded ▶

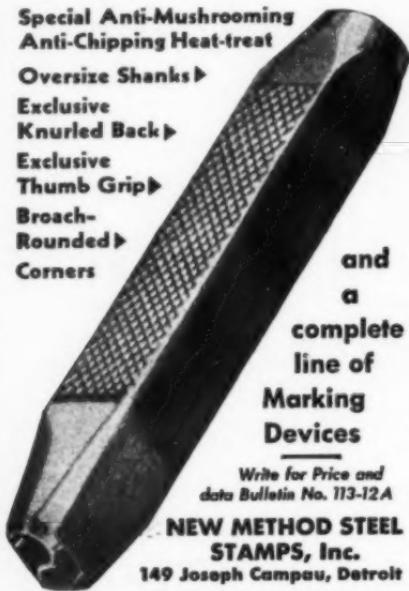
Corners

and
a
**complete
line of
Marking
Devices**

Write for Price and
data Bulletin No. 113-12A

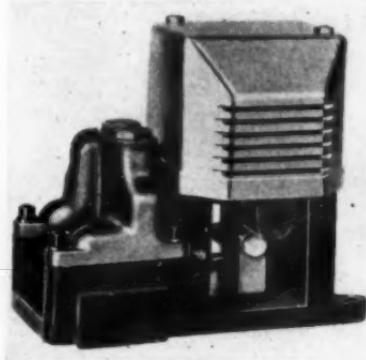
**NEW METHOD STEEL
STAMPS, Inc.**

149 Joseph Campau, Detroit



400 Welds Per Minute

The Ross Operating Valve Co., 6480 Epworth Blvd., Detroit, announce a new special model, solenoid operated, air



valve, built to meet manufacturers' demands for high speed operation of welding guns. Although it is claimed that this new Ross valve has operated at considerably higher speeds on experimental work, it is now said to be regularly delivering 400 welds a minute on production jobs. This, we are told, represents a decided advance in welding speed and enables new production records for manufacturers using this type of equipment.



Plain Type

CLOSED

TRADE

AUTOM

CLOSED

MARK

Offset Type

OPEN

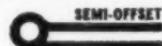
Open
holes,
cutouts
and bends
to blue-print
in metals
to suit the job.

THREE-FOURTHS OFFSET.

**AUTO MOULDING
& MFG. CO.**

2326 S. CANAL ST
CHICAGO

SPECIFICATIONS:
Open Width $\frac{5}{8}$ " to 6"
Gage Material .040 to .125
Pin Diameter .101 to $\frac{1}{4}$ "
Lengths to 120"



HERE'S the SAW you need



Built in Two Sizes:

No. 8—	No. 5—
8" diameter	5" diameter
round or 8"x16" flat	round or 5"x10" flat

Also, the new No. 9 Upright
Saw, a recent addition to the
Wells line.

**THE
WELLS
Metal-Cutting
BAND SAW**

*Write for the
facts TODAY*

**Fast — Accurate — Portable
Rugged — Clean Cutting . . .**

WHEN it comes to metal cutting—Wells has the saw to do the job! Bars—tubes—sheets—angles—any shape—can be cut quickly, accurately and economically. Wells Saws offer a minimum of upkeep cost, proved from years of service on all kinds of metal cutting jobs. They are the ideal money and time saving saws. Find out about them.

WELLS MFG. CORP.

WELLS METAL CUTTING BAND SAWS

THREE RIVERS, MICH.

K. O. Lee Duplex Welder

The K. O. Lee Co. announce a new heavy duty welder of 500 amperes capacity. It comprises two Model W250 welders coupled together in series, mounted on a truck with a junction box. Each W250 welder having a capacity of 250 amperes, the Duplex has a total welding capacity of 500 amperes. The truck frame is of heavy angle iron, mounted on two 24" diameter rubber tired wheels, and one 7½" steel caster wheel.

The unit operates on either 220 or 440 volts, and has a welding range of 20 to 500 Amperes. It will handle electrodes from $\frac{1}{8}$ " to $\frac{3}{8}$ " in diameter, and will weld material from the thin automobile fenders to the heavy castings and steel sections. Practically any desired welding heat can be obtained by plugging the selector or control cable of each individual welder in a heat tap of approximately one-half the total heat re-

quired for the job at hand.

It is claimed that the two welders



coupled together provide a more flexible and longer arc, and one that is easier to start.

It is also claimed that the Duplex Welder has other advantages over one large individual welder of 500 Ampere capacity. Two operators can weld simultaneously with the Duplex, because each individual welder can be operated independently up to 250 Amps. The bulk of welding work is done with a rod size that requires less than 250 Amps., so the purchaser of a Duplex really buys two individual 250 Amp. machines that can be used independently for the big percentage of the work, and jointly for the heavier jobs. For further information inquire of K. O. Lee & Son Co., Aberdeen, South Dakota.

SELLSTROM-IZE—and SAVE YOUR EYES

Goggles that fit; feel good and are. Light weight; adjustable; snug. A special kind for every job. New shapes and lighter weights in welders' helmets and shields; new Hoods and Masks. Comfort and fit in all Sellstrom equipment. CATALOG ON REQUEST.

SELLSTROM MFG. CO.
646 N. Aberdeen St. Chicago, Illinois

Model No. A



No. 3079

PETERS VERTICAL OSCILLATORY GRINDER

The speedy modern way of grinding and stoning tools and dies. The short oscillatory movement eliminates lines in ground parts—straight, smooth, square surfaces and adjustable to any required angle. Will show savings up to 80% on tool and die cost, with increased accuracy and versatility.

Write for bulletins giving full details.

PETERS TOOL COMPANY, INC.
114 E. Scott St. Milwaukee, Wis.



Model No. 101

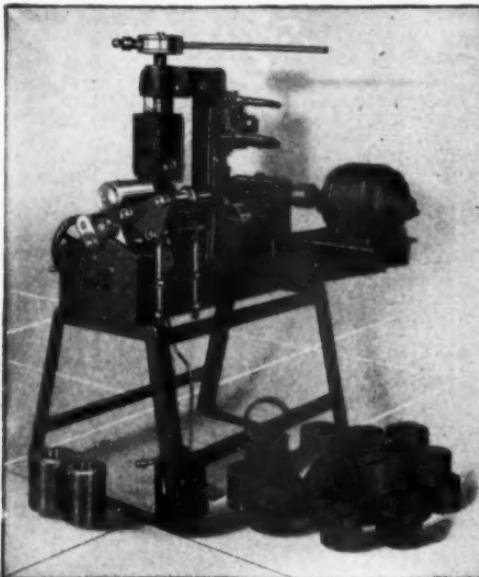
Get ROLLING

with a "Buffalo"

Your metal rolling problems will be no problems at all—if you put them up to a Buffalo Wrapping Roll. If you really want to "get things done"—and done right—at the lowest unit cost—find out about Buffalo Wrapping Rolls. You'll find that many items previously made in a more expensive way can be easily and more quickly rolled on these handy machines.

So—if you make or use metal rings or cylinders ranging in thickness from $\frac{1}{16}$ " to $1\frac{3}{4}$ ", you should look into the advantages of a Buffalo Wrapping Roll.

Write for Bulletin 3150.



BUFFALO FORGE COMPANY
161 Mortimer St., Buffalo, N. Y.
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

WRAPPING ROLLS

Leaders

**DEARBORN
GAGE COMPANY**

*Chrome Plated
GAGE BLOCKS*



Have No Equal!

Inspection and comparison
will prove this statement.



**DEARBORN
GAGE COMPANY**

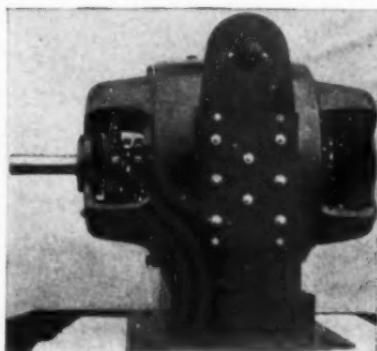
"Originators of Chromium Plated
Gage Blocks"

22035 Beech Street

DEARBORN - MICHIGAN

60-Cycle AC From a DC Motor

The Kato Engineering Co., Mankato, Minn., have designed a line of direct current motors, which in addition to driving a piece of equipment, also furnish 60 cycle a.c. current for the operation of an auxiliary function. For instance, spot welding transformers require alternating current.



One interesting application is on the Doall contour shaping machine manufactured by Continental Machines, Inc., Minneapolis. This machine does external and internal contour sawing and filing on any kind of material. To facilitate threading the saw through an internal sawing job, it is necessary to cut the band, insert one end of the saw through a starting hole and then butt weld the ends together. The machine has a unique built-in butt welding device for joining the band saw ends. The welder is automatic and includes a grinder for removing the flash from the weld.

When machines are supplied to customers who are in direct current areas, they are equipped with Katolight d.c. main drive motors, which also provide the a. c. necessary or operation of the butt welder.

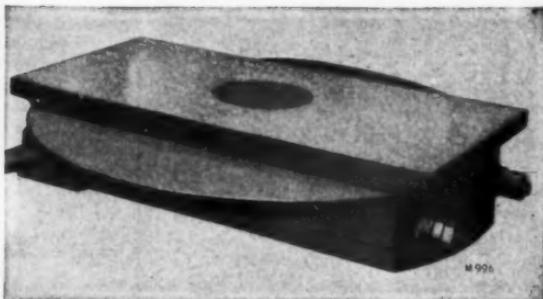
There are various other types of equipment which require alternating current. Among these are relays and controls, on machine tools and processing machinery; synchronous motors as used on time cycle equipment and the operation of fluorescent type lamps.

SUNDSTRAND INDEX BASES



Two Fixtures

Two fixtures on one Index Base make milling continuous except for momentary indexing.



SUNDSTRAND STANDARD INDEX BASE



Six Fixtures

Milling with six fixtures on one Base; continuous except while indexing 60°.



Pneumatic Indexing

Index Base with six-station fixture, automatic indexing actuated by air pressure.



Hydraulic Indexing

Milling with two Index Bases, two fixtures each; auto-indexed by hydraulic pressure.

For Rapid, Accurate Milling

Increase accurate production, save machine time, reduce work-handling by using Sundstrand Index Bases on milling and other operations. These bases speed successive operations by rotating work held in a single fixture; speed duplicate operations using two or more fixtures and changing work at one station while cutting at another, with only momentary indexing stops. Sundstrand Standard Index Bases, shown above, are highly accurate and durable, built low and compact; have hardened inserts that hold alignment; powerful, fast, single-lever clamping. They are made in six sizes for all makes of machines. Semi-standard and special applications shown at left. Complete details in Index Base Bulletin. Investigate. Write, today for Bulletin IB.

SUNDSTRAND MACHINE TOOL CO.

2535 Eleventh Street, Rockford, Illinois, U. S. A.

RIGIDMILS - STUB LATHES

Tool Grinders - Drilling and Centering Machines
Hydraulic Operating Equipment - Special Machinery



CUT COSTS-SAVE TIME TRY THIS SENSATIONAL **KIPP AIR GRINDER**

**10 DAY FREE TRIAL
PROVES ITS SAVINGS**

This FREE trial offer permits any concern with a satisfactory credit rating to try out any Kipp Air Tool for ten days. Grinders sell from \$9.75 to \$58.75, Chippers and Filers at \$19.75. The VT Grinder shown above, for tool room and production work, is \$58.75. Kipp Air Tools are proving indispensable in thousands of tool rooms and production departments. They give you highest speeds, lowest prices. New catalog gives details.



- Send Kipp Air Grinder Model _____ on your 10 day Free Trial Offer!
- Send the New Kipp Air Tool Catalog!

Name _____

Company _____

Address _____

MADISON-KIPP CORPORATION

207 WAUBESA ST., MADISON, WIS., U.S.A.



Mirror Finish Tips . . . just what the name implies for mirror-like finishing work.
Grinding Wheels . . . superb quality recommended for use with Kipp Grinders.

Stainless Steel Welding

A new stainless steel known as "Stainweld D" is announced by The Lincoln Electric Co., Cleveland, Ohio, for arc welding stainless steel of the 25% chromium, 20% nickel type, such as Iron and Steel Institute No. 310.

It is also used for welding various stainless steels to mild steels and for welding of steels which are air hardening and cannot be heat treated after welding, such as armor plate.

In use the arc length should be held short as possible without choking or sticking.

In general, preparation of the work and welding procedure are similar to mild steel welding. Surfaces to be welded should be free from all foreign material. Slag should be thoroughly cleaned. Thin sheets should be clamped against a copper backing to maintain alignment, reduce buckling and prevent burning through.

Polarity:—Electrode positive (plus)

For best results use only enough current to obtain a free-flowing arc and proper fusion to base metal. The following table may be used as a guide.

For vertical and overhead use 5/32" electrode or smaller with currents on lower side of range given.

Electrode Size

	Amperes
3/32"	30 — 70
1/8"	45 — 95
5/32"	80 — 135
3/16"	100 — 165
1/4"	140 — 225

"Stainweld D" comes packed in 25 pound containers and is 11 1/2" in length in all sizes listed above.



For Machine and Tool Work & Quick Set-Ups

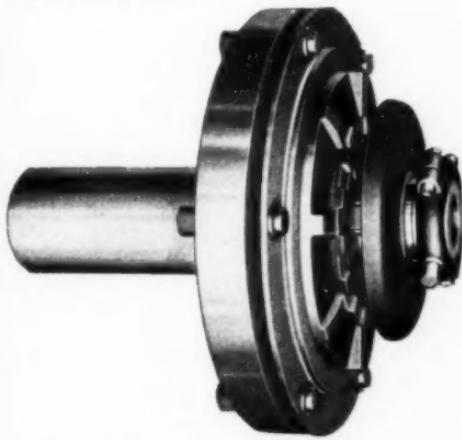
The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearing, .014 reading. New improvements.

Price \$5.00

Write for folder.

J. R. Reich Manufacturing Co.
334 Triangle Ave., Dayton, Ohio

THE CONWAY DISC CLUTCH embodies the very latest practical developments, in design and construction.



Easy Engagement
Instant Release
Dragfree Idling
Overload Capacity
Sturdy Pattern
and
Interchangeable
Parts are some of

the CONWAY features that solicit a trial on your machine to prove its claims to be — THE LAST WORD IN FRICTION CLUTCHES.

Have you Conway bulletins P-24, L-28 and XYZ-L on Disc Clutches, S-10 on Overload Release and Slip Clutches, No. 36A on Compression Clutches, K-32 on One-Revolution Clutches, E-8 on Expansion Clutches?

Patented in U. S. A. and Canada

THE CONWAY CLUTCH COMPANY
1541 Queen City Avenue, Cincinnati, Ohio

I CAN'T HEAR YOU— TALK LOUDER!



"This Noise is Terrible"

Does noise interfere with important telephone calls? Then install a Burgess Acousti-Booth. The acoustic lining blots out noise. It creates a "zone of quiet" in the noisiest places. You can telephone without shouting and messages are heard distinctly. Errors are prevented. Calls are made faster. Open construction. Easy to keep clean. No stuffiness. No troublesome doors. Ample ventilation.



Patented

This Acousti-Booth Soaks Up Noise
Mail Coupon for Free Booklet

Burgess Battery Company, Acoustic Division
Dept. HM, 500 W. Huron St., Chicago
Please send Free booklet describing Burgess
Doorless Acousti-Booth and how it makes telephoning easy in noisy places.

Name _____

Firm Name _____

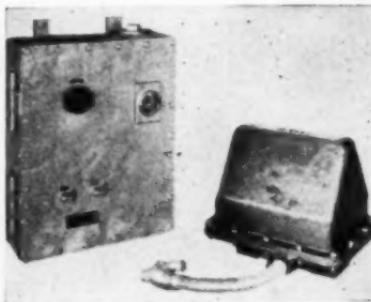
Street-City _____

BURGESS ACOUSTI-BOOTH

Operating under Burgess Patents

"Explosion Proof" Vibrators and Controllers

The Syntron Co., 300 Lexington Ave., Homer City, Pa., have just added to their line of vibrators, an "Explosion Proof" model, for use in plants where atmospheric conditions are highly inflammable or explosive.



The vibrator, a heavy, pulsating electro-magnet, is fully encased, in a thick, electric-furnace steel case, with ground joints, and with an armored cable lead. They are used for attachment to bins, hoppers, chutes, etc., to prevent arching over and hanging up of material, and to insure a free flow at all times.

Remote electric control panel containing a rectifier, operating switches and rheostat for controlling the vibrator's power, is fully encased in a cast iron case, with ground joints and approved explosion proof fittings.

Stanley Screw Driver Catalog

An attractive new 28-page catalog presents the wide variety of Stanley screw drivers for industrial users. The line embraces standard drivers of many types and sizes with wood and composition handles; drivers and power bits for use with Phillips screws, offset drivers, etc. Included is the "Stanloid" line of drivers with nickel molybdenum shanks and two tone amber colored handles made from one of the toughest of non-metallic substances.

Address Stanley Tools, New Britain, Conn., for a copy.



MAKE REAL SAVINGS ON DRILL PRESS WORK

Save like the Chicago Manufacturer who installed the above battery of four Duro Ball Bearing Drill Presses and reported a surprising reduction in production costs. The operator moves quickly from one spindle to the next for continuous drilling and tapping. Just one set up where two were formerly required. And, what is equally important, this new equipment cost less than $\frac{1}{2}$ as much as his older and less efficient equipment.

Let us show you how you too can save by installing Duro Modern Precision tools.

Made By

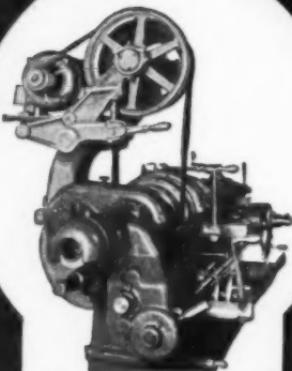
The Manufacturers of America's Finest and Most Complete Line
of Power Driven Machinery

DURO METAL PRODUCTS CO.
2655 N. Kildare, Chicago, Illinois

Dept. BB3,

DURO PRECISION DRILL PRESS
for fast Low-cost production

The Keyhole to Greater Production and Profits



TORQ DRIVES

open the door to increased production—up to 25% or more—easily installed, they become an integral part of the machine—coupling increased flexibility and efficiency with a marked reduction in operating costs, TORQ DRIVES will bring your equipment up to modern standards of performance.

- Variable Belt Tensioner
- All Steel Welded Column
- All Parts Fixture Machined and Bored
- Rigid Construction
- Self Aligning Ball Bearing Housing
- Neat Appearance
- Easily Installed

Write today for bulletins giving complete information.

The Torq Electric Mfg. Co.
6606 Carnegie Ave. Cleveland, Ohio

Stanley Plug Tip Soldering Irons

Electric soldering irons of a new design, fitted with plug tips make the extensive line offered by Stanley Tools New Britain, Conn., more complete. The plug tip is inexpensive and differs from the screw tip in that the tip fits into the heating head of the iron and is held by a screw. The screw permits easy adjustment and removal of tip.

The heating unit of the iron is hermetically sealed to prevent corrosion, is wound around a hollow core and conducts a uniform flow of heat to the plug tip. The handles are of hardwood and have an adjusting sleeve which permits handle extension. Each iron is furnished with six feet of approved heater cord, cord strain relief and a tool rest stand.

Plug tips for the irons are available in two types—copper and armor clad.



The armor clad tip is similar to the copper tip except that it is clad with a special metal coating that protects the surface of the copper and produces a long life tip, free from corrosion and rapid wear.

Stanley plug tip electric soldering irons are made in four sizes—105 watts, $\frac{5}{8}$ " tip diam., 150 watts, $\frac{1}{2}$ " tip diam., 200 watts, $\frac{5}{8}$ " tip diam., 350 watts, $\frac{7}{8}$ " tip diam. Each size is available with all copper tip or armor clad copper tip.

A Soldering Handbook

"Short Cuts and Better Methods of Soldering and Tinning" is a profusely illustrated booklet printed in two colors. It contains interesting information on the behavior and proper use of various solders. It also contains valuable information, suggestions and short cuts on how to save labor and material when applying body solder.

Address Glaser Lead Co., Inc., 29-31 Wyckoff Ave., Brooklyn, N. Y.



PRICE \$87⁵⁰.

Includes 3-Speed Gear Box, Support Brackets and Motor Rails.

4-Speed Units—\$10.00 additional.

Made In Right or Left Hand Drive.

Designed to drive machines that require from 1-HP to 5 HP motors. Brackets for most types of tool-room and production machines in stock.



Esta Unidad Motorizada toda sus Maquinas

PRECIO \$87.50
F. O. B. Detroit

Incluye Caja de 3 Velocidades, Abrazadera y Base de motor. Unidad de 4 velocidades: \$10.00 extra.

Disponible con mando derecho o izquierdo.

Moderniza toda máquina de 1 a 5 H. P. Adaptable a cualquier tipo de maquinaria.

Para más detalles sobre esta valiosa agencia, escriba o cablegrafe
Cablegramas: DRIVCO

DRIVE-ALL MANUFACTURING CO.
3401 CONNER AVE. : DETROIT, MICHIGAN

CHICAGO



MANUFACTURED AND STOCKED BY
CHICAGO DIE CASTING MFG. CO.
2502 W. Monroe St., Chicago, Ill.
CATALOG ON REQUEST

Air Line Cleaners

The Logan Engineering Co., 4912 Lawrence Ave., Chicago, Ill., announce that their line of Aridifiers for removing moisture and oil from air and gas lines is now complete in all sizes from $\frac{3}{8}$ " to 10".



All sizes are claimed to assure effective removal of dirt, scale, oil and moisture from compressed air lines and gas lines. Foreign matter impinges on a multiplicity of "propeller blades" revolving in opposite directions and propelled by the flow of air or gas. The arrested contamination and moisture is collected in the lower housing from where it is drawn off as occasion warrants.

Bulletin 939 is now available which gives complete operating and installation details.

Business-Government Contracts

An analysis of the principles and procedures relating to contracts between government and private business is contained in the N. A. M. Law Digest, Volume III, No. 3, published by

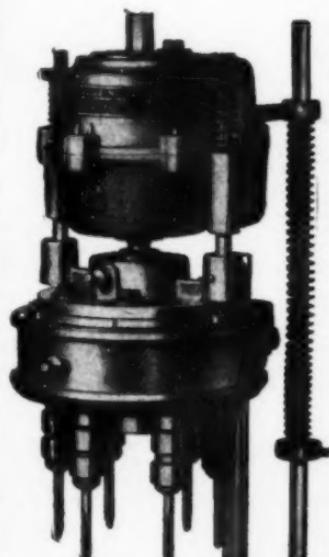
Ettco - Emrick

TAPPING ATTACHMENTS

THE EXACTING REQUIREMENTS OF TAPPING IS UP TO THE FRICTION CLUTCH

ETTCO PIONEERED SENSITIVE TAPPING WITH A LEATHER LINED FRICTION CLUTCH. AS YET WE HAVE FOUND NO SUBSTITUTE TO EQUAL ITS SMOOTH, SENSITIVE ACTION. IT SAVES TAPS, LASTS LONGER AND INSURES ACCURATE HOLES.

SEVEN SIZES
FROM THE
FINEST TO
1" TAPS



MULTIPLE SPINDLE TAPPING HEADS DRILL HEADS

"A STANDARDIZED SYSTEM"

ETTCO HEADS ARE A MANUFACTURED PRODUCT ASSEMBLED TO FIT YOUR NEEDS.

SERVICE IS FROM STOCK PARTS,
THE COST IS LOW AND YOUR JOB
IS FROM 100 TO 500% FASTER.

LET US HAVE A PRINT OR SAMPLES
OF YOUR SMALL PARTS—WE WILL
BE PLEASED TO SEND A STANDARD-
IZED QUOTATION.

ETTCO TOOL CO.

594 JOHNSON AVE.,

CHICAGO

BROOKLYN, N. Y.

CINCINNATI

DETROIT

the National Ass'n of Mfrs., 14 West 49th St., New York, N. Y.

As the Federal Government represents "perhaps the largest purchasing agent" in the American market, understanding of Federal requirements is essential in the matter of contracts—not only because of the increasing peacetime needs of national defense, but because of a "growing tendency in recent years to extend such requirements by statute or interpretation to manufacturers and suppliers having no direct

contractual relationship with the government."

In a general way, the requirements are given, and it is explained how more complete information may be obtained when needed.

Screw Machine Engineering

A new publication devoted exclusively to screw machine engineering and bearing that title, is being issued at 34 West Main St., Rochester, N. Y.

TANNEWITZ DI-SAW

SAVES AN AVERAGE OF \$4.80
EACH HOUR IT'S USED



Inside and outside cuts on dies, shoes, templets and endless other jobs can be done in a small fraction of the time required by former methods. Saws, files and polishes. A highly developed, large capacity machine.

Write for literature.

THE TANNEWITZ WORKS
GRAND RAPIDS - MICHIGAN

The cover features the title 'SCREW MACHINE Engineering' in large, stylized letters. Below it, a box contains the text 'In this issue!' and 'THESE DIFFERENCES stretch your threading dollars'. Another box on the right says 'WITH DURCO Thread-Gauge Tools'. At the bottom, there's a section titled 'RADIATION AS A CUTTING AGENT'.

Page size is 8 $\frac{3}{4}$ " x 11 $\frac{5}{8}$ " and much of the material is of a practical, informative nature, covering the many phases and details of setting up and operating these versatile machines.

OPEN THE WAY TO GREATER PROFITS



BY USING **S & S HINGES**



BUTTS AND CONTINUOUS LENGTHS — for GUARDS — CABINETS — CASES — BOXES — LUGGAGE

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S & S MACHINE WORKS

HARDWARE DIVISION

4539 WEST LAKE STREET

CHICAGO, ILLINOIS

**GET UP
LOOK AND SAVE**

with

R AND L

Turning Tools

Why ignore the savings that could be yours through the use of R & L Tools?

In first cost alone, there's a saving of at least \$200 over the cost of separate tools required to perform the jobs that can be handled easily with one R & L.

Even more important are the operation savings . . . in time, effort and manipulation . . . and these mean more production and more profit.

One R & L takes the place of at least seven separate tools, saving hours on set-up and operating time . . . saving through the multiple operation features which permit doing two or three jobs simultaneously . . . such as drilling, turning and burnishing at one operation.

Then there's the important maintenance savings because R & L tools are simple and sturdy, with a minimum number of wearing parts.

Write TODAY for the full story of R & L savings.

R and L Tools
1825 Bristol St.
Nicetown, Philadelphia, Pa.



Eklind-Turchan Duplicating Unit

The Model 4-HC hydraulic duplicating unit is designed for the average run of work in die shops making Bakelite, plastic, rubber and drop forge molds and dies.

Oil pressure is supplied from the tank to feed the quill and arm, up and down at the proper rate to follow the contour of the model. Because of the extremely light tracer pressure, soft wood or plaster models may be used. The makers assert that an inexperienced operator can soon acquire the ability to duplicate within a few thousandths. Either hand or power feed may be used.

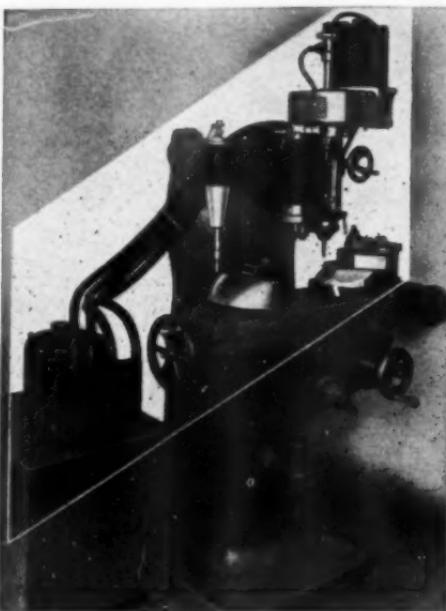
The quill will operate independently of the duplicating control when it is necessary to do straight milling, drilling or boring—or the arm can be removed entirely by loosening three nuts. Furthermore, the hydraulic attachment may be adapted to any model 4-H Eklind head now in use.

As to capacity, the distance from cutter to tracer is 16". Hydraulic quill feed is 3 $\frac{3}{4}$ ". Head can be mounted on side of over-arm, increasing capacity to mill dies as long as table feed and as wide as cross feed.

The unit includes the 4H head with plain adapting bracket and 20 gallon pressure tank driven by a $\frac{3}{4}$ h. p. motor, wrenches, holder and tracers.

The 4-H head features six speeds—250

to 4000 r.p.m. Quill has an adjustment of 4". Spindle is 23" long, mounted



in double ball bearings top and bottom, 12" apart. Lower bearings are preloaded—top bearings allow for spindle expansion and contraction. Collet capacity is $\frac{1}{2}$ ".

Address Universal High Speed Tool Co., 549 W. Washington Blvd., Chicago, Ill., for a new bulletin giving full details.



GEARS IN STOCK— IMMEDIATE DELIVERY

Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on gears of any kind. Send us your blue prints and inquiries.

Write for Catalog No. 70

CHICAGO GEAR WORKS,

440-48 N. OAKLEY BLVD.,
CHICAGO, ILLINOIS



We Repeat
CHECK these
features!

Mall GRINDERS

TRADE MARK

incorporate *ALL* of them

A Type and Size for EVERY Job!

Large, husky, constant speed, aluminum frame, ball bearing motors, available in ventilated or dustproof types, with 100% overload capacity.

- Speed, Lightweight, Portability
- Heavy duty flexible shafting
- Two to three times more power in the operator's hands
- Built for long life, trouble-free service.
- ONE unit can be used for a number of jobs . . .
SANDING, GRINDING, POLISHING, BUFFING
or WIRE BRUSHING.

Consult us freely. Call on us for expert help in solving your grinding or polishing problems. Our wide experience on thousands of installations makes it possible to determine quickly the type of power unit and attachment to use for the most satisfactory results.

Write for catalog.

MALL TOOL COMPANY

7742 SOUTH CHICAGO AVENUE CHICAGO, ILLINOIS

Crystal Lake Plain Grinder

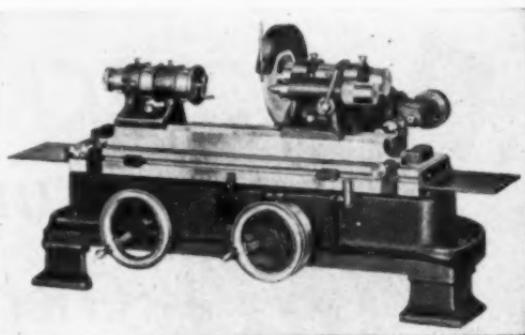
A new plain grinder developed by The Crystal Lake Machine Works, Crystal Lake, Ill., features a wheel head with micrometer stop, providing for accurate grinding to size, regardless of the pressure put on the feed wheel. The feed wheel dial reads directly to .0001".

A spindle speed of 3200 r.p.m., is available and there are four work speeds. Rear shaft for pump drive starts and stops with work drum.

Grinder takes a 6" wheel with $\frac{7}{8}$ " spindle hole and face widths from $\frac{1}{8}"$ to $\frac{3}{8}"$.

Table travel feed is triple geared, $1\frac{1}{2}"$ to one turn of hand wheel. A sensitive adjustment of platen for taper grinding is provided. The platen swiv-

els seven degrees either way on hardened and ground center pin. Feed



dial reads to .0005" in diameter of work.

The platen is designed with one vee and one flat for perfect alignment of head and tailstock. The hardened, ground and lapped tailstock spindle is provided with spring tension adjustment. The lapped, hardened and ground headstock spindle is equipped with a cone type front bearing on bronze bushings.

Swings $2\frac{1}{2}"$ over platen—a 4" x 8" capacity grinder.

"Instant Heat" Electric Solderer

A new electric solderer for all kinds of light soldering is announced by Ideal Commutator Dresser Co., 1441 Park Ave., Sycamore, Ill.

Called "Instant Heat" because it heats upon touching the wire or terminal to be soldered, this tool should be ideal for all kinds of light service work. Hardly larger than a lead pencil it easily reaches inaccessible places.

Heating stops instantly upon lifting the carbons from the job so that as soon as the soldering is finished the tool can be put away in the kit. Can also be laid down without fear of scorching any article it touches.

The line current is reduced by a transformer to harmless low voltage



AUTOMATICALLY SHARPENS METAL SAWS IN GANGS

Up to $5\frac{1}{2}$ " diameter and up to $1\frac{3}{4}$ " thickness.
100 SAWS of 36 GAUGE CAN BE SHARPENED AT ONE TIME.

The saws are automatically indexed and sharpened within a variation of plus or minus .001 of exact diameter of entire lot.

WRITE FOR CIRCULAR

The WARDWELL MFG. CO.
3165 FULTON RD. CLEVELAND, O.

New! STANLEY No. 150
CONTOUR GRINDER



**FOR RAPID PRECISION
FINISHING OF DIES, GAUGES,
TEMPLETS, SPECIAL SHAPES**

A small investment in this new High-Speed Stanley Contour Grinder will pay big dividends in faster, easier work, making brass templets, grinding dies, "finding blanks," trimming non-ferrous metals, correcting hardening distortion.

Check the unusual features shown in the photographs and you'll agree it's an ingenious electric tool — a big value at its price. Write for literature, or ask your Stanley Distributor to demonstrate on your own work. Stanley Electric Tool Division, The Stanley Works, 141 Elm St., New Britain, Conn.

**Costs Only
\$69.50
COMPLETELY
EQUIPPED**

Including Light Fixture,
Extension Cord, Switch,
Chuck, Arbor, 6 Wheels, 2
Rotary Files, Wrenches.



Sturdy 12" x 12" table. Adjustable light that swings clear for big work.



3/8 h.p., 18,000 r.p.m. Universal motor unit tilts 90° to 45°. Motor Unit is removable for tool post grinding.

STANLEY



**ELECTRIC
TOOLS**

A Complete Line for Industry — "Cost Less Per Year"

LITTELL Air-Blast Valve for Faster Safer Production



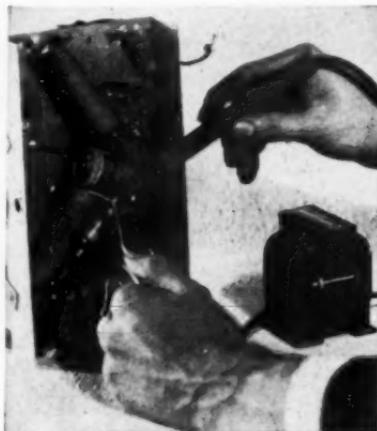
PAYS its cost in a few weeks time in — increased production — greater safety — economy of air. Automatically ejects pieces. Operator's hands are never in danger zone. Quickly adjustable air nozzle.

Automatic Roll Feeds—

dial feeds, magazine feeds, hopper feeds, for punch presses. Reels for coiled stock. Send for Circulars.

F. J. Littell Machine Co.
4153 RAVENSWOOD AVE., CHICAGO, ILL.

so there is no danger from shock or burns. Heat is concentrated on exact part being soldered which eliminates danger of damaging adjacent delicate parts. Current is used only when in actual contact with work.



Complete unit includes transformer and soldering tool. Size of tool is only $6\frac{1}{4}'' \times \frac{5}{8}''$ in diameter. Power consumption is approximately 80 watts. Shipping weight $2\frac{1}{2}$ lbs.

IF YOU USE TAPS YOU NEED WALTON TAP EXTRACTORS



They remove taps broken at or below the surface of the hole easily, quickly and without injury to the threads.

Send for Folder 132 giving sizes, styles and prices.

Test their worth by 30-day Free Trial.

The Walton Co.
95 ALLYN STREET
HARTFORD, CONN.

A Heavy Welding Job

When a large steel plant found that its sheet-mill roll frame was badly worn, it was repaired quickly by arc welding. The real problem was to get it done without stopping production of vital materials, so it was done during the Christmas period. The mill was shut down when Friday night's turn stopped and then dismantled, the 41,-000 - pound cast - steel housing being delivered to the Canadian Westinghouse Machine Shop December 23.

Building up the surface to permit both the feet and bearing recess to be machined to the original contours and size required 405 cubic inches of weld metal weighing 115 pounds. This was obtained from 160 pounds of $\frac{1}{4}$ " down-hand welding electrodes, showing an over all deposit efficiency of 72% of the

Tool Maintenance Is A Problem In Every Plant

The Grinding of CUTTING TOOLS is IMPORTANT although an often neglected operation. Properly ground tools many times spell the difference between PROFITS OR LOSS—Success or failure.

* * * * *

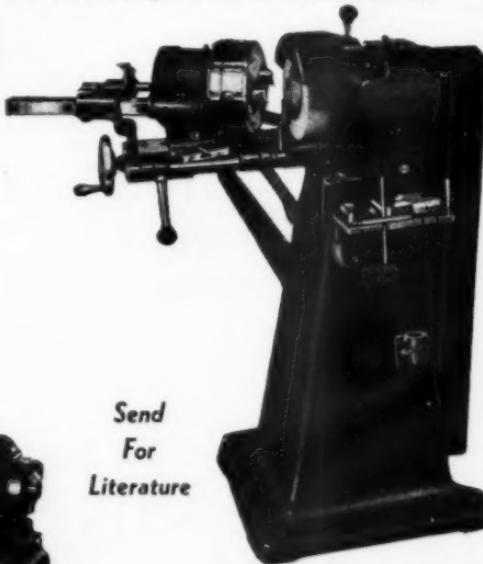
Modern Production machines are designed to use High-Speed, Free Cutting, ACCURATELY SHARPENED DRILLS, TAPS, CUTTERS, FACE MILLS, etc. To get the most from the Machine, the tools must be ground the correct way—THE OLIVER WAY.

The OLIVER METHOD
guarantees uniformity
—accuracy—free cutting—lower tool costs
—longer tool life.



S-1 Machine for Sawing out and filing
Dies, gages, cams, Templates, etc.

*Send
For
Literature*



Cut illustrates the new 510 Oliver automatic twist drill pointer—for drills $\frac{1}{4}$ to 3"—Variable point angles—Variable clearances.

OLIVER INSTRUMENT COMPANY
1408 E. Maumee St., Adrian, Michigan



electrode used with the Flexarc welders. Welding commenced at 11:00 a. m. and continued by means of relief operators without a moment's interruption,

DESMOND GRINDING WHEEL DRESSERS & CUTTERS



We manufacture the only complete line of Dressers and Cutters. Also a complete line of Machinists' and Utility Vises. Write for catalog and name of your nearest dealer.

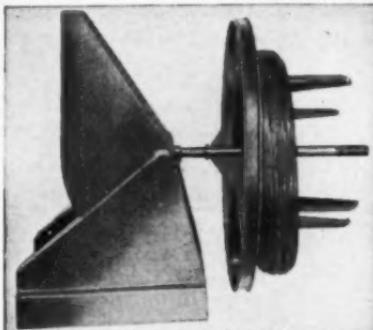
**DESMOND-STEPHAN MFG. CO.
URBANA, OHIO**

Canadian D. S. Mfg. Co., Ltd.
Hamilton, Ont.

except for two changes of position, until 8:00 a. m. on December 24, when it was handed over to the machine shop staff with the welding work completed.

Moslo "Shiftweight" Reel

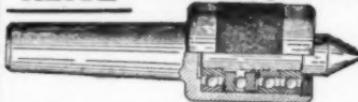
A shifting counterpoise weight is a distinguishing feature of the reel offered by Moslo Machinery, Inc., 5005 Euclid Ave., Cleveland, O. It is said



to be designed in such a way that regardless of position of wire coil, the necessary counteracting weight is always applied.

It is claimed that one man can easily place a 300 lb. coil on the reel and swing it into position. There are no foot levers. Locking latch is controlled through a knurled spindle in center of reel. After loading, the operator releases the locking mechanism and places coil in feeding position. An upper ring holds coil in position, and an adjustable friction brake prevents overrun.

"ALIVE" Ball Bearing Centers



"They turn with the work"

Write TODAY — and let us tell you more about them.

MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

After 2 MONTH'S EQUAL SERVICE

which of these sleeves

would YOU depend on for Accuracy?

ORDINARY
SOFT
SLEEVE



ACTUAL UNRETOUCHED PHOTO



MIDWEST
HARDENED
AND GROUND
SLEEVE



A GUESS isn't necessary to know what your answer is because, while ordinary soft steel sleeves soon become marred and nicked causing tool misalignment, MIDWEST sleeves which have been scientifically hardened and precision ground give you an unbelievable increase in length of useful tool life, and you are always assured of taper concentricity.

YOUR TOOL COSTS will be reduced definitely because a MIDWEST Hardened sleeve will outlast at least ten to fifteen identical ordinary soft sleeves and still be absolutely dependable for accuracy.

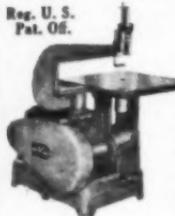
● Send immediately for Bulletin 16-J—no obligation.

MIDWEST TOOL & MFG. CO.

2349 W. Jefferson, Detroit - - - - Offices in all principal cities

The "Butterfly" Filing and Die Making Machine

Reg. U. S.
Pat. Off.



Constructed as per
specifications of United
States Naval Aircraft
Factories.

Beware of Imitations!
Our machine carries the
Butterfly trade mark.

NEW MODELS D. & E. L.

The "Butterfly" owes its ever increasing popularity to its high standard of efficiency. It is the quietest machine of its kind and is well adapted to highly accurate work. It is being used by the leading manufacturers of the United States and Europe and also by the United States Government.

Write for folder
D. and E. L.

HARVEY
MANUFACTURING CORP.
161 Grand St., New York, N.Y.

NIELSEN Heavy Duty *Live* Centers

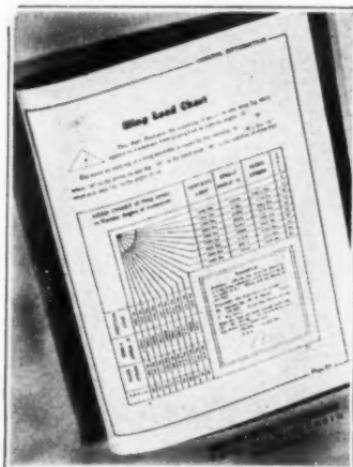
Write for
catalog on
live centers

Adapted
for heavy
duty work.
Precision type
ball and roller
bearings assure
maximum capac-
ity for high speed
production and long
service.

NIELSEN, INC. LAWTON,
MICH.

Handbook on Slings

Written especially for use by safety men, superintendents, engineers, purchasing agents, and all others concerned with handling problems (where



slings are employed), this publication contains 56 pages of information, many reference tables and photographs.

Copies of the new Sling Handbook may be had by writing, on company letterhead, giving name and title, to MacWhyte Co., Kenosha, Wis.

THE SIMPLIFIED OPTICAL PYROMETER



Unique construction enables operators to rapidly determine temperature even on minute spots, fast moving objects or the smallest streams; no correction charts, no accessories, no upkeep.

THE PYROMETER INSTRUMENT CO.
102-105 Lafayette St., New York, N.Y.

The New PROCUNIER

UNIVERSAL Tapping Machines

If you're seeking maximum production tapping, with accuracy, flexibility, dependability and economy, you'll be interested in the new PROCUNIER Universal.

It offers remarkable speed and precision tapping on production jobs, plus three revolutionary features:

1—Four speeds ranging from 395 to 2050 r. p. m., handling a wide range of jobs efficiently for which conventional high speed tapping machines are inadequate.

2—One machine handles tap sizes from No. 2 to $\frac{1}{2}$ " through two interchangeable tapping heads.

3—Extra long spiral compensating springs conveniently located, with wide range hand screw adjustments, maintain pre-set tap feeding and reversing pressures independent of operator.

Whether for highly specialized production, or work involving wide variations, the PROCUNIER Universal offers outstanding advantages.

Write TODAY for Catalogs 37 & 38.



PROCUNIER SAFETY CHUCK CO.
14 SO. CLINTON ST., :: CHICAGO, ILL.

GUARANTEED FOR 5 YEARS

When you purchase a STEEGE Drive for your lathe, shaper, miller, etc., you're protected by our broad 5-year guarantee. STEEGE Drives are easily installed—prices \$35.00 up—sent on 30 days' approval. *Let us send catalog.*



W. L. STEEGE MACHINERY CO.
(Our 23rd Year)
548 W. Monroe St., Chicago, Ill.

DON'T DISCARD IT

Effect a 30% to 75% saving in tool costs, by having your worn-out or obsolete tools made over by RENU—and guaranteed as good as new, both for appearance and performance.

RENU TOOL COMPANY
275 E. Milwaukee Ave.
DETROIT, MICHIGAN

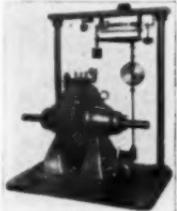
...Renu IT!



Taylor "Hi-Eff" Dynamometer

Here is the recently improved Taylor "Hi-Eff" hydraulic dynamometer. It is available in a wide range of sizes, suitable for high speed—low torque and also low speed—high torque testing.

Today's "Hi-Eff" is said to be the result of many years of prime mover testing. The heavy duty, rigid construction, over-size ball bearings and precision balanced rotors, assure long life and dependable testing data. An accuracy of 99.7% is claimed, due primarily to careful design in balance, craftsmanship, and low frictional loss, resulting in true power measurement on the scale.



Speed, load, lubrication and packing adjustments, are readily accomplished while operating. These are essential features when lengthy life tests of continuous operation are a part of the program. Controls are arranged for easy, rapid manipulation throughout the entire range. The combination peripheral and side-wall vanes, in both stator and rotor, are said to give remarkably high capacity in a comparatively small machine.

Descriptive literature and complete data will be provided promptly by Taylor Sales Co., 2330 West Clybourn St., Milwaukee, Wis., upon request.

HERE'S A REAL DRILL VISE

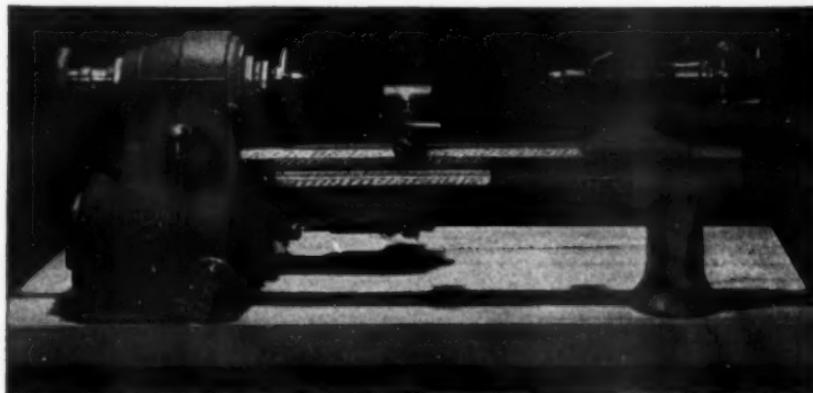


Shur-Grip Jaws 5-in. wide, hardened, reversible; open 5-in. Hold round, square and odd shapes—usable three ways. Satisfaction guaranteed—price, only \$12.50.

Write for folder and full information

JOHNSON TOOL CO., INC.
65 Massachusetts Ave.,
East Providence, R. I.

© 1940 Johnson Tool Co., Inc.



DON'T BUY UNTIL YOU HAVE SEEN THE

NEW--"Stark"

Integral Drive
Precision Bench Lathe
PATENTED

ITS BUILT-IN DRIVE LEADS ALL COMPETITORS

The first tool of its class with built-in motor and speed changing mechanism, entirely eliminating millwrighting.

Nothing under the bench . . . nothing overhead. Special bench or even bolting to bench, unnecessary.

The $\frac{1}{2}$ h. p. geared ball bearing motor drives through a disc clutch and vertical V belt sheaves, and through V belts to the headstock, giving any speed at the turn of a wheel (located in front of lathe) from 156 to 2200 r.p.m. in Standard Model, and 260 to 3500 r.p.m. in High Speed Model. Speeds registered on a neat indicator.

Simply moving control lever to right engages the clutch, vertical position

releases, moving to the left instantly brakes the moving spindle.

Time-tried Stark double taper bearings in Standard Model. Best precision preloaded anti-friction bearings in High Speed Model.

Both $\frac{3}{4}$ and 1 inch collet capacity furnished in either model . . . 9 inch swing . . . 40 inch length of bed . . . Weighs 310 pounds . . . Takes regular Stark Attachments, Collets and Chucks.

Stark accuracy and stamina are traditional . . . incorporated in this streamlined new lathe.

Priced at only slightly more than other precision lathes with SEPARATE complicated drives.

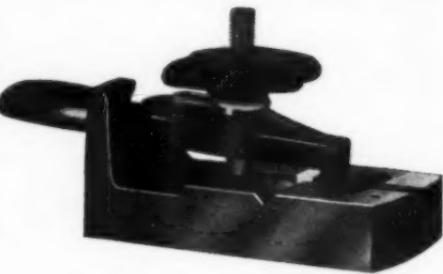
STARK TOOL CO. WALTHAM, MASS., U.S.A.

ESTABLISHED 1868 • ORIGINATORS OF THE AMERICAN BENCH LATHE

K-O Drill Press Vise

Combining the functions of a drill press vise, toolmaker's clamps, V-blocks, drill jig and angle plate, a handy new tool is offered by K-O Products Co., Benton Harbor, Mich.

Small rounds can be gripped in the V-groove for drilling through the diameter. For drilling into the end of round stock, clamp the work in the cross groove and turn the vise on its side. Many other operations are handled easily with this versatile little gadget, such as clamping two or more flat pieces together, holding templates on die blocks, etc.



Two sizes are offered. The No. 2 takes flat pieces of any width or length up to $2\frac{3}{4}$ " thick, and rounds up to $2\frac{3}{4}$ " in diameter.

"Thor-Nado" Portable Electric Hammer

An electric hammer featuring a "Sling-Shot Drive" is the latest product of the Independent Pneumatic Tool Co., 612 W. Jackson Blvd., Chicago.

Measuring $13\frac{1}{2}$ " long and weighing 14 pounds, this powerful new hammer is adapted to a wide variety of heavy duty applications, including star drilling, channeling, chipping, cleaning, scaling, cutting, gouging, beading, caulking, and seaming. Its capacity in concrete, limestone, and brick is 1 inch.

The piston is driven in a hammer action by means of a shock-proof rubber connection. This whips the piston back and forth at a speed of 1600

blows per minute, acting as both power accumulator and shock-absorber. There is no metal connection between piston, gear train and motor.



The universal type motor is housed at right angles to the piston barrel and transmits power through heavy duty helical cut gears. Ball bearings are sealed against dirt and dust.

Ventilation is of the patented Thor tangential type. The unit is easy to dismantle for cleaning and inspection. Inspection covers are provided for the brushes. The momentary grip switch with push-button lock for continuous operation is of the heavy duty, two-pole type. Further information is given in circular No. E-32.



Essex

The makers of a complete line of lubricating devices since 1901.

Send for catalog.

ESSEX BRASS CORP.
2000 Franklin St., Detroit, Mich.



Non - Chattering . . . Bypass Piston Type Oil Relief Valves

An important use of these modern valves is in connection with oil hydraulic pumping units, where a specific pressure is required to be maintained, especially on machine tool hydraulic mechanism, oil burning equipment, rams, presses, etc.

The cylindrical piston closes off the port in a shearing manner and does not seat abruptly against body of valve, thereby overcoming any pounding or chattering noise, ordinarily encountered with standard valves using disc seats.

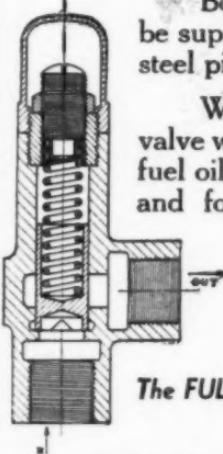
They are made in pipe sizes from $\frac{3}{8}$ " to $1\frac{1}{2}$ " and are suitable for pressures from 0 to 350-lbs., with a change of but five different springs for the pressure variation (state pressure required when ordering).

Bodies may be of cast iron or bronze and can be supplied with brass, hardened steel or stainless steel pistons.

Where fuel oil is used, we recommend a bronze valve with stainless steel piston, due to the fact that fuel oil contains a certain amount of condensation and foreign matter, and a harder, non-corrosive piston is required.

FULFLO Valves require no attention after being installed and set for the required pressure.

*The FULFLO Line also includes Centrifugal Coolant Pumps.
May we send you bulletins?*



THE FULFLO SPECIALTIES CO., INC.
BLANCHESTER, **OHIO**

MAGNETIC CHUCKS

MEMO

*Get more
Drilling
& Tapping
done for
less money*



with BOICE-CRANE HELMET HEADS

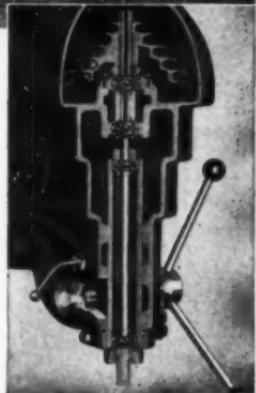
Boice-Crane Helmet Heads are the SUPER light duty Drill Presses with the famous totally enclosed drive. The most up-to-date and largest plants use them. But don't take from that that they're expensive for they're not.



Every comparison with other light duty drill presses shows Helmet Heads are built *stronger* for longer, harder service. That's true of the head spindle, quill, bearings and every other part. They are your best bet for light drilling, reaming, and tapping.

COMPLETE RANGE OF MODELS

Bench and Floor models. Two and four spindle manufacturing type units for consecutive operations. Other models have lightning-fast reverse Tapping Heads with important new features to reduce setup time and tap breakage. For utmost economy on lightest jobs use our No. 1600 series Drill Presses. Made in same range of types as Helmet Heads.



BUILT TO LAST LONGER

New engineering principles exclusive in Helmet Heads like the 6 tooth *absolute* type spline, *line-bored* head and longer quill seats, add years of extra service.

DON'T DELAY! REAP THE HARVEST OF SAVINGS POSSIBLE WITH BOICE-CRANE HELMET HEADS

Write Today for fact-jammed catalog, prices and name of nearest BOICE-CRANE dealer.

BOICE-CRANE COMPANY

1729 NORWOOD AVE.
TOLEDO, OHIO.

MAGNETIC CHUCKS DEMAGNETIZERS

Waterproof—wet or dry grinding. A real magnetic Chuck—suitable for any purpose. Guaranteed to provide highest magnetic holding power on 110 or 220 volts D. C. current.



6½'x18' \$100.00

Scientifically designed — highest quality workmanship. Also made in the following sizes — 5¾"x13" — \$42.50 . . 8"x24" — \$55.00 . . 10¼"x37" — \$110.00

IMPROVED DEMAGNETIZERS

Engineered for quick removal of magnetism from work. Model B-2 is for large jobs and Model J-1 for small work. A single pass over the stationary poles demagnetizes the work completely.

Mo

Model B-2 \$55.00

Model B-2 measures 7¾"x12" 6¾". Model J-1 measures 7¾" 7¾"x6¾". Both demagnetizers are equipped with pilot light and signal controls and operate on 110 Volt A. C. current.

Write for descriptive literature.

L-W CHUCK CO.
1-7 N. ST. CLAIR ST.
TOLEDO OHIO

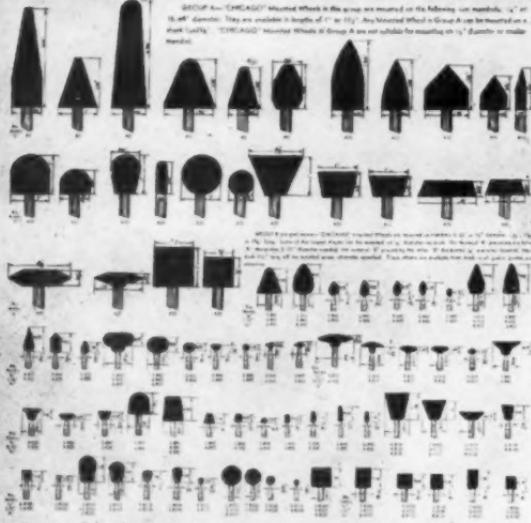
CHICAGO MOUNTED WHEELS OF V/T SUPER

150% LONGER LIFE

Chicago Mounted Wheels made of the new V/T Super Bond prove by tests conducted in many plants on snagging and exacting operations to have from 150% to 300% longer life. They're tougher; can take more punishment; grind more pieces per wheel, faster and without sacrifice of cutting action.

V/T Super Bond holds its original shape longer. Wheel will not ridge on grinding welds, sharp corners, sinking dies, barbering, and other work of this character.

"CHICAGO" MOUNTED WHEELS



GROUP A - STANDARD PLAIN MOUNTED WHEELS

The "A" series is "standard". The plain mounted wheel is the most popular wheel for general grinding operations. It is used for straight grinding, corner grinding, and for all types of snagging operations.

There is a "CHICAGO" Mounted Wheel for every grinding job.

GROUP B - SPECIALTY PLAIN MOUNTED WHEELS

The "B" series is "specialty". The specialty mounted wheel is used for straight grinding, corner grinding, and for all types of snagging operations.

There is a "CHICAGO" Mounted Wheel for every grinding job.

GROUP C - SINKING PLATE MOUNTED WHEELS

The "C" series is "sinking plate". The sinking plate mounted wheel is used for straight grinding, corner grinding, and for all types of snagging operations.

There is a "CHICAGO" Mounted Wheel for every grinding job.

CHICAGO WHEEL & MFG. CO.

400 South Dearborn Street, Chicago, Ill. 60605

CHICAGO WHEEL & MFG. CO.

400 South Dearborn Street, Chicago, Ill. 60605

ALL WHEELS SHOWN ON THIS
CHART ARE ACTUAL SIZE

V/T Super Bond meets the challenge of today's exacting requirements. Cuts your grinding cost. Let us prove it to you in your own plant on your toughest mounted wheel job.

Let us send you one of these Mounted Wheels without cost or obligation. Tell us the kind of job, type of equipment and size you want to use to make your own test.

Complete Catalog Free
upon Request.

FREE MOUNTED WHEEL CHART

Ideal for ready reference in the shop. A Wall Chart 22x15", showing actual size and shape of every standard Chicago Mounted Wheel.

CHICAGO WHEEL &

Makers of Quality Products for

1101 W. Monroe St.,

Dept. HB,

Canadian Distributor: Canadian Trade Corp., Ltd.

1332

PER BOND

GREATEST FORWARD STEP IN 30 YEARS

V/T Super Bond is one of the most important developments in mounted wheels. Wherever the use of a tough, hard bond that will stand the gaff is required, V/T Super Bond will be found without peer. Nothing can compare with it in endurance, stamina and performance. There is a shape and size to handle every grinding job faster, better and at lower cost.

Chicago Mounted Wheels

✓ The FIRST small abrasive wheels mounted on steel mandrels to be offered to industry.

✓ The FIRST with this special new and exclusive bond - V/T Super Bond, unequalled in strength and long life.



HANDEE TOOL OF 1001 USES

Here's a small "power house" that can be carried to any part of the shop and used wherever there is an electric outlet. Repairs hard-to-get-at parts on machinery without removing the part—smooths off rough spots or dies and moulds—cleans delicate mechanisms—grinds, drills, polishes, cuts, routs, carves, sands, saws, sharpens, engraves, cleans, etc. Uses 300 accessories. There are more Handees in use today than all other tools of this type combined.

De Luxe model weighs 12 oz. 25,000 r.p.m. \$18.50 postpaid with 6 Accessories.

TRY A HANDEE FOR 10 DAYS IN YOUR OWN PLANT



- Send Free Wheel. Size _____
- Free Wall Chart
- Catalog of Handee Products and Grinding Wheels.
- De Luxe Handee on 10-Days Trial.

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products for 40 Years

Dept. HB,

Chicago, Ill.

1332 Williams St.,

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ONE RESPONSIBLE SOURCE for THREE Separate Tool Reconditioning Services



Your cutters, drills, reamers, end mills and files reshot, your pneumatic tools and parts rebuilt to standard size with hard chrome, and your machine parts and dies hard chrome plated, all by One Responsible Source.

Not three separate companies, but ONE. There's no need for several companies to handle your tool reconditioning services, when there is One Responsible Source for all three.

Send for our beautiful illustrated catalogs on all three services



EASTERN CUTTER
SALVAGE CORP.

MASTER TOOL
CO., INC.
Cleveland, Ohio

THE MASTER
CHROME SERVICE, INC.
Cleveland, Ohio

DOALL SAVED 22½ HOURS

Northwest Airlines, Inc. of St. Paul, Minn., made this special Wrench from chromalloy steel in 80 minutes on the DoAll, 40 minutes for sawing, 40 minutes for filing. Outside dimensions are 24" long, 18" wide. Former time was 24 hours burning, milling, shaping and sanding.



UNMATCHED PERFORMANCE



Contour Sawing, the new DoAll process of machining, is recognized as the fastest precision method of removing metal; cuts out internal and external shapes from any metal up to 10" thick.

Does work of 3 machines. DoAll is a moderately priced, rugged, precision machine tool that replaces shaping, milling and lathe work on a large variety of jobs with enormous savings.

Used in large and small plants in 30 countries, by such firms as General Electric, Ford, Douglas Aircraft, Foster Machine, C. M. St. P. & P. R. R., Radio Condensor, Corey Steel, Baldwin Locomotive, Ferro Stamping, Underwood, Elliott Fisher, etc.

★
DO-ALL
Contour Machine
BAND SAWING
BAND FILING
BAND POLISHING
★

Let a factory trained man bring a DoAll to your plant and show you what it does, what it saves on your own work.

H-3

- Send data on the DoAll.
 Send Free Hand Book.

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FREE—New Handbook on Contour Machining—158 pages of valuable metal working helps.

CONTINENTAL MACHINES, INC.
1380 S. Washington Ave., Minneapolis, Minn.

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Made in 9", 12", 15", 18", 21", 28".

With or without dividing plates.

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ALFRED A. TROYKE
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NAILS, RIVETS, SCREWS MADE TO ORDER IN ANY METAL



HASSALL
Products

CLAY & OAKLAND STS.
BROOKLYN, N.Y.

New
Catalog
Will Be
Ready Soon.

Write for
Illustrated Catalog

Lewellen Transmission With Safety Control

A special Lewellen transmission is designed to regulate stoker speeds for feeding fuel at rates to maintain the boiler pressure setting automatically. The control attached to boiler is set for any desired steam pressure. A slight



deviation of this pressure will result in a movement of the control, connected to the safety lever on the transmission. While the lever follows any rapid motion of the controlling device, speeds are adjusted only at a safe controlling rate of acceleration. Should the lever move suddenly the speed is changed gradually by the action of the springs, the speed always coming to the speed corresponding with the position of the control which operates the safety device on the Lewellen transmission.

Address Lewellen Mfg. Co., 1065 E. 10th St., Columbus, Ind., for full details.

for your lathes

SENECA FALLS Automatic WORK DRIVER



Self Centering ... Quick Acting ... No Slip. Attaches to any chuck plate or spindle. Provides a slip-proof, balanced drive reducing chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO., 314 Falls St., Seneca Falls, N.Y.

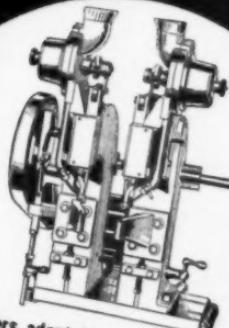
AUTOMATIC RIVET SETTER

For radios, switches,
toys, electric parts
and appliances, auto
parts and accessories,
and other small
assemblies.

Will give you volume production savings even on short assembly runs. Less capital investment.

WITH
Adjustable
CENTERS

Sets 1 or 2 rivets at a time



Centers adaptable to 6". For setting rivets up to $\frac{1}{4}$ " body diameter. Bench and pedestal types.

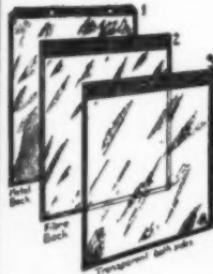
No obligation for assembly analysis. Send sample or blueprint with inquiry.

CHICAGO RIVET & MACHINE COMPANY

TUBULAR AND SPLIT RIVETS IN ALL RIVET METALS

1855 SO. 54th AVE. (Cicero P. O.) CHICAGO, ILLINOIS

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Cleveland, O.

**FEDERAL
PRESSES**
are known for
EFFICIENCY
AND
*QUALITY
WORK*



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Coast to Coast.
It will pay you
well to find out
why.

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FEDERAL PRESS COMPANY
ELKHART - INDIANA

Holden Develops New Furnace

A new type of pot furnace developed by The A. F. Holden Co., New Haven, Conn., has as a particular feature, approximately 30% recuperation of fuel.



This equipment can be built for oil or gas fired units and the difference between it and the conventional types is but one exhaust on this equipment.

The unit has a specially constructed wall so that the exhaust gases pass at right angles to the incoming fuel. By this method of heating, the gas or oil is preheated before it actually enters the chamber and the terminal velocity of gases passing out of the exhaust is only sufficient to support combustion. The makers claim that the gases are slowed down approximately 50% in their travel from the exhaust and therefore greater fuel efficiency and economy are provided.

As an additional feature, the pot becomes a part of the top framework of the furnace preventing seepage into the brickwork around top of the pot.

Equipment can be made in any size, in which case there may be more than one burner and one exhaust. However, for conventional size equipment, running up to 24" in diameter, one burner and one exhaust will deliver maximum efficiency.

MARSHALLTOWN



No. 5 FLYWHEEL TYPE

The Marshalltown Line includes inclinable presses from 5 to 70 ton capacity.

**DESIGNED
AND
BUILT
PRESSES
GIVE BETTER
PRODUCTION
AND LONGER
LIFE**

Features of design include more die space, chrome nickel cranks, wrist pin connections and many other proven elements of correct design. Literature fully describing this sturdy, dependable line of presses will be sent on request. It will pay you to investigate.

MARSHALLTOWN MFG. CO.
900 East Nevada Street,
Marshalltown, Iowa

Hartford Bench Taper Gage



This gage has been developed to not only meet tool-room requirements, but manufacturing requirements.

It is made in a most substantial manner of the best materials. The gage plates are hardened and ground. In operation the gage sets on a bench convenient to the workman. It is adjusted to the height of his eyes, and placed so that he looks toward the light through the gage. The gage plates are set to a master plug gage. It is found much more accurate and rapid to operate than a ring gage.

Height to center line of gage: greatest, $30\frac{1}{4}$ in.; least, $23\frac{1}{4}$ in.; weight, 23 lbs.

Capacity—From nothing to No. 14 Brown & Sharpe taper.

Built and sold by

The Hartford Special Machinery Co.
HARTFORD, CONN.

Milliken Ball Turret Heads



Will hold six tools. Can be used on bench, engine and turret lathes.

Wonderful producers.

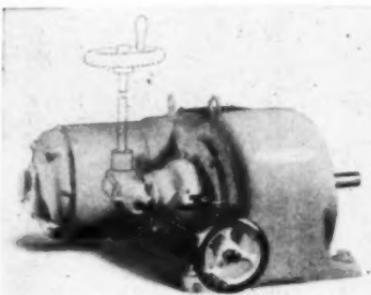
No. 1, $3\frac{1}{2}$ in. dia. Sockets $\frac{3}{8} \times 1$ in. deep, Price \$17.00

No. 2, $5\frac{1}{4}$ in. dia. Sockets $\frac{3}{8} \times 1\frac{1}{2}$ in. deep, Price \$30.00

Milliken Machine Co., West Newton, Mass.

Varidrive Remote Control

Here is a new single, right angle, mechanical remote control for Varidrive motors, developed by U. S. Electrical Motors, Inc.



It provides an accurate, simple means of selecting the desired operating speed when the Varidrive is mounted beneath or above the driven machine or is otherwise inaccessible.

Control shaft may be extended at a 90° angle in any of eight different directions. An enclosed set of helical right angle gears makes this possible. This right angle remote control permits hand wheel to be placed within easy reach of operator so that the exact desired speed can be maintained without difficulty at all times.

Bulletins explaining this control are available. Write Dept. 128, 80 - 34th Street, Brooklyn, New York or 200 East Slauson Avenue, Los Angeles, California.

HANDY RACKS

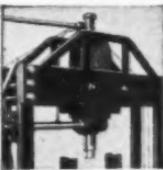


Four times the capacity in convenient floor and height space. Widely used in production and tool steel factories, vocational schools, colleges, warehouses, large and small shops. Low cost—no crating required. 30-day approval required. Send for circular.

Wm. S. Yehe Supply Co.
503 Mahoning Road
CANTON, OHIO

KRW HYDRAULIC ARBOR PRESSES

HAVE SPEED AND POWER FOR INDUSTRIAL USE



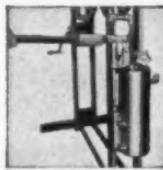
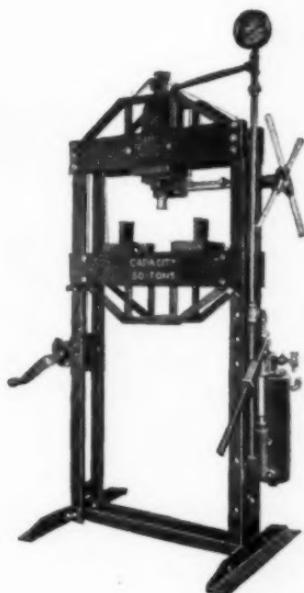
Rack teeth cut directly into ram—no separate rack bar.



Heavily constructed enclosed drum and ratchet raises and lowers bed.



Extensible cross-arms for greater leverage have locating grooves for extended and central positions.



Oil reservoir tank has convenient filling plug and shut-off valves.



V blocks furnished have machined shoulders for accurate alignment on bed.



Machined shoulders align V blocks when inverted positions and prevent slippage.

Built with the speed and strength necessary for industrial use, KRW Presses perform such operations as broaching, assembling, straightening, bending, offsetting, squeezing, pressing, and flattening. Small blanking operations can be performed when the blanking dies are built into a die set provided with guide pins.

Strictly a one-man press, special KRW features minimize operator fatigue. Trussed design of bed and crown members results in extreme rigidity and accuracy.

Write for new bulletin describing this cost-cutting equipment.

PRICES F. O. B. FACTORY, ARCADE, N. Y.

No. 37—35 ton Hydraulic and Sensitive Arbor Press	\$150.00
No. 37E—50 ton Hydraulic and Sensitive Arbor Press	180.00
No. 37F—75 ton Hydraulic and Sensitive Arbor Press	300.00

Gauge and fittings, \$20.00 extra on all presses.

K. R. WILSON

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The M-B "Utility" Pneumatic
Grinder. Model U.—T. R.
A 60,000 R.P.M. Unit



Steel Housing (For Safety)

A WORTHY COMPANION TO OUR
 FAMOUS "SUPER SPEED" MODEL
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SPECIAL GREASE SEALED BEARINGS
 NO LUBRICATION REQUIRED.

AN ABUNDANCE OF POWER.
 OTHER MODELS, ALSO AIR LINE FILTERS
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 LUBRICATORS.

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KOEELITE
DIAMOND TOOLS



Deliver a Known
 Quantity—and Quality
 —of Service

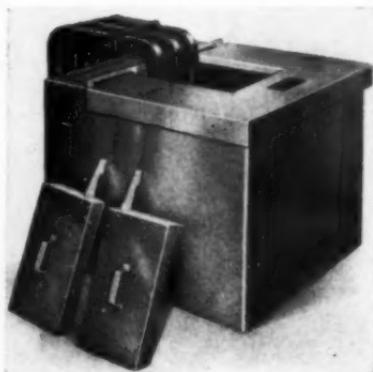


**KOEEL DIAMOND
 TOOL COMPANY**

DETROIT

**Holden Offers Electric
 Furnace**

The A. F. Holden Co., New Haven, Conn., offers a new design three phase electrode furnace with vertical individual adjustable electrodes. The electrodes may be used on the narrow width of this type furnace up to 30" length.



A cover plate is provided for loading or unloading which drains any bath back into the furnace and this construction permits loading from three sides.

Hand operated covers are used for over-night shutdowns or small individual loads.

A new type of flexible cover will be available for these units within 60 days which permits use while work is in process. This is said to reduce heat input 50%.



MODERNIZE present equipment with a RUSSELL BORING BAR. Bores 9/16" to 12" dia. with boring axis parallel to shank axis. One compact tool, with micrometer adjustment.

RUSSELL BORING BAR CO.
MIDDLETOWN. OHIO

Employment Regularization

A very complete analysis of American industry's methods of regularizing employment has just been completed by the National Ass'n of Manufacturers "to assist manufacturing companies in their efforts to achieve greater employment stability and greater protection for employees."

The study, to be made available to manufacturers soon, describes the various methods utilized to reduce the violent "ups and downs" in production and employment, and lays emphasis on the resultant benefits to industry and the employees.

Eighty-nine leading manufacturers comprised the N. A. M. Committee on Employment Relations.

Where companies have succeeded in providing their employees greater continuity of work, a number of important benefits have resulted:

1 — Reduction of tax rate through merit-rating provisions in State Unemployment Compensation Laws.

2 — Increased plant efficiency.

**3 — Greater use
of plant and
equipment.**

4 — Lower production and labor costs.

5 — Avoidance of overtime pen- alties during peak periods.

6 —Reduced la-

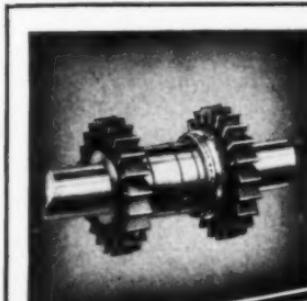
bor turnover costs.

7—Elimination of expense incidental to examining and training new employees.

8—Increased versatility and flexibility of employees.

9—Upgrading of workers.

The study further stresses the benefits to employees in furthering their security and their sustained income through efforts to increase and extend continuity of employment.



**FOR ALL MAKES
OF MACHINES**

Adjustable and Solid

SPACING COLLARS



Adjustable Spacing Collars

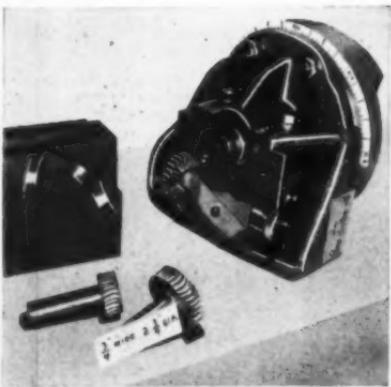
For straddle milling, gang milling and multiple slotting set-ups. They eliminate the use of shims.

Solid Spacing Collars
Are standard .001" to 3"
thick. Less than $\frac{1}{8}$ " are
not hardened.



**SCULLY-JONES
and COMPANY**
1905 S. Rockwell St.,
CHICAGO, ILLINOIS

Die Sinkers



Here's the New ABER Cherrying Attachment

It's an introduction to a new and better method of Cherrying, equally adaptable to vertical or horizontal mills.

The distinctive new ABER Cutter is (Patent Applied For) actually driven by its own teeth - which eliminates complications and simplifies the Cherrying technique.

Speedy, accurate and dependable, the ABER Attachment is easy to operate and affords clear, unobstructed vision.

The special radius tooth design provides longer, wider and stronger cutting teeth for the cutter width, eliminates end thrust and assures quiet operation. The sturdy teeth give a shearing cut which prevents chatter and assures long life between sharpening periods. Attachment is roller bearing equipped and is adjustable, $1\frac{1}{8}$ " to $3\frac{1}{2}$ " diameter $\times 2$ " wide. Angle positioning is facilitated by the large calibrated dial.

*Also write for information on the New
Aber Curved Tooth Shear Cut
Woodruff Key Cutters.*

Aber Engineering Works
1613 Flett Ave., Racine, Wis.

Ross Offers Horn Model Press

Supplementing the familiar Nos. 0 and 1 Model Rousselle Punch Presses, the David J. Ross Co., Benton Harbor, Mich., now offer a Horn Model. These small presses have earned a distinct place for themselves in many shops, handling small jobs rapidly and efficiently, and releasing larger presses for the larger work.

In general design, the new Horn press is similar to the other Rousselle units.



Main bearing and pin are $1\frac{1}{4}$ " x $3\frac{5}{8}$ ". Stroke is 2" (a 3" stroke can be provided at extra cost). Top of bolster plate, front to back, right to left is $11\frac{1}{2}$ " x $14\frac{1}{2}$ ". Bolster plate is $1\frac{1}{2}$ " thick. Bed travel is 7" — minimum 4", maximum 11". Depth of throat, ram center to frame is 5". The Flywheel weighs 150 lbs., and operates at a speed of 200 r.p.m. Weight of the press without skids is given as approximately 925 lbs. Pressure at bottom of stroke is 15 tons. Size of hole in ram for punch shank is $1\frac{9}{16}$ ". A one h.p., 1750 r.p.m. motor is required.

An attractive new bulletin gives full information on the whole line.

Who's Too Small For A Health Program?

There are two sides to the problem of industrial health. In large plants employing thousands, it is unusual to find anything less than the best of medical and surgical attention under the care of a complete staff of physicians and registered nurses. But in small plants with less than 500 employees the answer is not so satisfactory.

What makes the matter so important is the fact that 62% of the country's manufacturing employees earn their livelihood in the small plants — the very plants that have the greatest need for medical service.

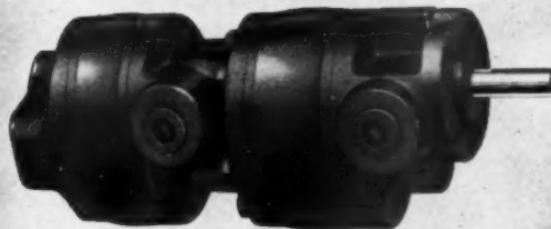
For this reason, the Committee on Healthful Working Conditions of the National Ass'n of Manufacturers has been studying the problems of the small plants. A method has been worked out by which these many plants can obtain the advantages of good industrial health in a completely practical way.

The "why" and "how" of this method are outlined in a booklet:—"Who's Too Small — For a Health Program?" A copy of the booklet

will be sent free if you address the Division of Industrial Health, National Ass'n. of Mfrs., 14 West 49th St., New York, N. Y.

Many advantages are cited by plants that have adopted such programs in the way of absenteeism reduction, accident reduction, labor turnover, compensation reduction, etc.

Briefly, the booklet outlines a method of setting up such a plan.



—Special Pumps for YOUR needs

... for coolant — pressure —
lubrication — hydraulic operation
of machines — and miscellaneous
combinations.

Tell us your pump needs —

Brown & Sharpe Mfg. Co.
Providence, R. I.
U. S. A.

BROWN & SHARPE
PUMPS

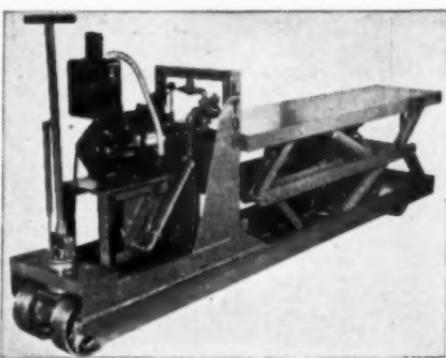
LBS

Lyon Sheet Handling Truck

The problem of keeping sheets of steel at convenient heights for operators in feeding sheet metal machines such as shears, presses, etc. was solved by the Lyon Iron Works, 508 Madison St., Greene, N. Y. by the use of their new sheet handling truck with hydraulic elevating table.

It is of the toggle lever type and the table is elevated by four hydraulic rams or hoists, pressure for which is furnished by a hydraulic pump driven by a 2 h. p. motor. Lowering of the table is facilitated, particularly when empty, by a separate hydraulic ram. It is also available with a hand operated single speed or a two speed hydraulic pump.

This type of truck can be furnished in various specifications, although the one shown is of 6,000 lb. capacity, size of table 20" x 84", lowered height 22",



elevated height 40", elevation 18".

Elevation or lowering of table is controlled by a conveniently located valve lever and the table may be inched up or down or elevated or lowered at any speed within its range.

Index Mills Pay Greater Dividends

Considering the Investment than Any Machine You Can Put In Your Tool Room—



No. 39 Mill

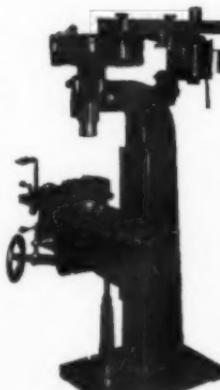
No. 39 is a thoroughly modern high speed vertical, indispensable on tools, dies, jigs and fixtures. Mills and drills a die 8"x16" at one setting. Uses end mills up to $\frac{3}{8}$ " in tool steel. Has No. 9 B & S taper in ball bearing spindle. Six speeds, 375 to 2820 r. p. m. Swivel head controlled by worm and worm gear. $3\frac{1}{4}$ " spindle travel.

No. 40 is the same as No. 39 basically, with equipment added making it a combination Mill and Locator. Verniers cross and longitudinal. Infinite speeds from 100 to 2820 r. p. m. Uses end mills up to $\frac{3}{4}$ " and bores $3\frac{1}{8}$ " holes.

You cannot afford to neglect investigation. Write TODAY to:

**BLANK & BUXTON
MACHINERY CO.**

JACKSON, MICHIGAN



No. 40 Mill

Nicholson Files for Stainless

The increase in the use of Stainless and other alloy steels has created a special problem in filing. The chromium and nickel content of these new steels makes them tough and dense. It causes them to have an abrasive action that tends to shorten the useful life of general purpose files.

The Nicholson File Co., Providence, R. I., have developed a new file for Stainless. Properly used with a light pres-

sure and a slow, steady stroke, this new file removes the metal rapidly with little effort, and leaves a good finish. On Stainless and other alloys, these new files will be found to last much longer.

The new files are available in the same shapes and sizes as the line of general purpose files. "For Stainless Steel" is inscribed on the tangs of these new files, and they sell at regular list prices.

MARKED - IDENTIFIED *Permanently*



MODEL 25

PART NUMBERS,
HEAT NUMBERS,
PATENT NUMBERS
MANUFACTURER—INSTRUCTION DATA—INSPECTION

Positive, Permanent MARKING ON YOUR PRODUCTS ASSIST PROSPECTS TO ORDER, MAKES IT EASIER TO BUY—NEW, REPEATS AND REPAIRS. GIVES YOU A DEFINITE RECORD OF PERTINENT DATA ON EACH PART PRODUCED.

The Pneumatic Marking Machine ILLUSTRATED IS OUR HI-DUTY MODEL 25 GENERAL PURPOSE TOOL FOR SHORT RUNS OR PRODUCTION WORK. IT OPERATES FROM YOUR SHOP AIR LINE AND IS ONE OF NUMEROUS MODELS BUILT TO PRODUCE NEAT, PERMANENT MARKINGS QUICKLY ON METAL FABRICATIONS.

WE WILL BE HAPPY TO MAKE SPECIFIC RECOMMENDATIONS UPON RECEIPT OF SAMPLES OR PRINTS OF PARTS TO BE MARKED, SHOWING APPROXIMATE LETTERING, ITS LOCATION ON THE PART, WITH REQUIRED HOURLY PRODUCTION.

**MARKED PARTS ADVERTISE
IN THE RIGHT PLACE, AT THE RIGHT TIME.**

*Unlike John Alder —
"They Speak For Themselves."*

GEO. T. SCHMIDT, Inc.

1802 Belle Plaine Ave., Chicago, Ill.
Builders of Marking Equipment Since 1895.

Send for complete catalog of our full line of marking Tools, Machinery and Equipment.

LUMA

Combination
Etchtool —
— 3 —
Tools
in 1



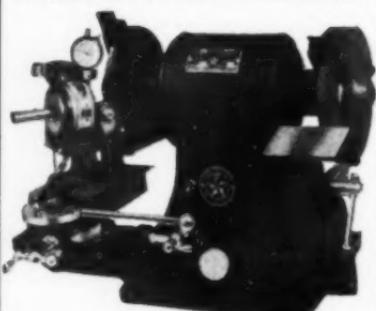
Luma Marking and Demagnetizing SIMULTANEOUSLY

Writes on hardened steel — demagnetizes at the same time—with carbon point does light spot annealing and soldering jobs. Compact—easy to use—dependable.

Send for details—5-day FREE TRIAL OFFER!

Luma Electric Equipment Co.
Dept. H—Main P. O. Box 132, Toledo, Ohio

Precision Drill Grinder



Simple to operate—dependable—speedy—this Precision Grinder will enable you to produce perfect joints on standard twist drills in sizes from No. 41 (.096) to $\frac{1}{8}$ " (.625).

Send today for more details.

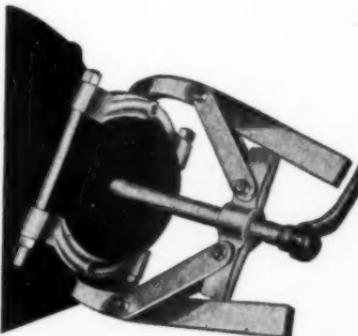
Star Machine & Engineering Corp.

Division Star Electric Motor Co.

Bloomfield, New Jersey

Owatonna Sheave Puller

Designed for use with OTC Gripomatic Pullers, the Owatonna Tool Co., Owatonna, Minn., offers a pulling attachment to remove multiple V drive sheaves.



The makers emphasize that it is impractical to attempt removal of these sheaves by hooking onto the outer periphery with a jaw puller. In this manner, the sheaves become distorted and damaged. The new OTC attachment is said to overcome this danger. The pull is applied at the base of the V groove and the pulling strain distributed over a greater area. The OTC Gripomatic is then applied to provide the actual pulling power.

The combination is shown in use on a 10" sheave. Maximum capacity of the No. 680 attachment is 10". It will pull any sheave regardless of the number of V grooves up to this diameter.

For use on sheaves from 8" to 10" the No. 1004 OTC Gripomatic puller is recommended with the sheave pulling attachment.

Complete information may be obtained from bulletin No. C-P-40.

American Cut-Off Machine

A new machine of the bonded-abrasive wheel type is announced by the American Instrument Co., 8010 Georgia Avenue, Silver Spring, Md.

Cuts up to $3\frac{1}{2}$ " can be made on materials with flat surfaces. Rods, tubing and the like up to 6" thick can

be cut by rotating the material as it is being cut.

True, clean cuts are made speedily and precisely by means of a motor-driven 12" diameter rubber-bonded abrasive wheel (0.04" or 0.06" thick)—without chipping or breaking the material.

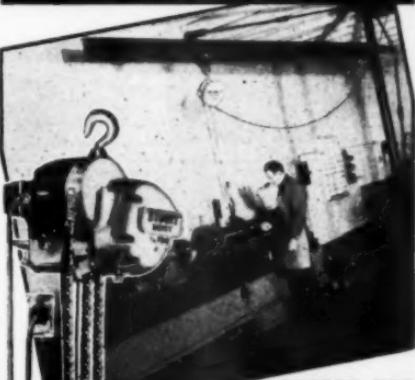


The machine is especially suitable for slicing all kinds of tubing and is said to make extremely short cuts. For example, lengths of 1½" diameter glass tubing as short as 1/32 in. can be cut off easily and quickly, with smooth, parallel, unchipped edges.

The machine consists essentially of a non-corrosive cutting table (adjustable for cuts of various angles), a cutting wheel direct-connected to a 115-volt 60 cycle a-c. motor, a centrifugal pump for pumping water to the spray heads that play steady streams upon the cutting wheel, mounted on a rigid steel stand.

Complete details are given in the manufacturer's Bulletin No. HM 2074.

Portable Electric BUDGIT HOISTS



BEFORE THE "BIG BOSS" STARTS CHECKING INTO COSTS . . .

Change costly waste into profit by installing "Budgit" Electric Hoists wherever you now lift by hand or with chain blocks! . . . They increase profits by turning waiting time of machines and men into working time.

"Budgit" Hoists come in 250, 500, 1000, and 2000 pounds lifting capacity with speeds to suit today's tempo . . . All weigh so little you can move them from job to job.

Slim budgets can afford "Budgits"! Prices start at \$119. Nothing else to buy before you can use them. You simply Hang Up, Plug into the nearest electric socket, and Use!

Send for catalog containing complete information and "Time Savings Calculator" that shows savings they earn.

SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.
435 BROADWAY • MUSKEGON, MICHIGAN



Makers of all types and sizes of Electric and Hand-Operated Cranes and Electric Hoists . . . Send all your Crane and Hoist inquiries to Shaw-Box!

Hang Up, Plug In, USE!

"ALNOR" Velometer
An All Purpose Air Velocity Meter
—Instantaneous,
Direct Reading.

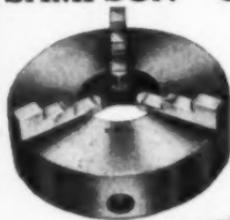
Measures total and static pressures as well as velocities.

Write for catalog

ILLINOIS Testing
Laboratories, Inc.
158 W. Austin, Chicago



SAMPSON CHUCKS



UNIVERSAL
GEARED
SCROLL
CHUCKS
WITH TWO
SETS OF
JAWS

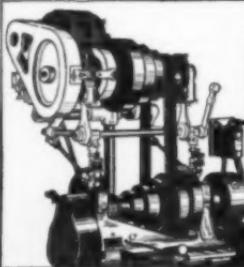


4-JAW
INDEPENDENT
CHUCKS
WITH SOLID
REVERSIBLE
JAWS

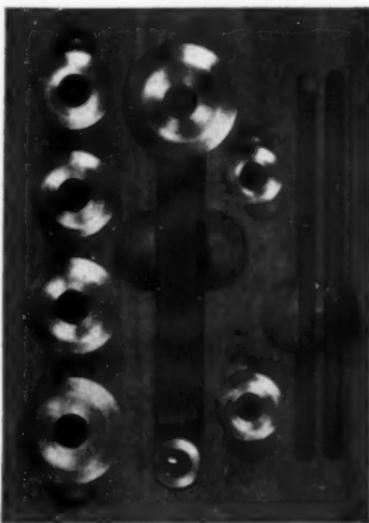
Ask For Complete Catalogue on Sampson Tools.

The outstanding features of Sampson Chucks are strength and accuracy. Steel Alloy Bodies are stronger than Iron Body Chucks. Steel Chucks have scrolls and bearings of Chrome Nickel Steel. Provided back plate is correctly fitted Sampson Universal Chucks are Guaranteed True Running Within .002".

Sampson Tool Co., Inc., 101 Walker St., New York, N.Y.



Forest City Radius Tool
This new tool may be used on lathes, turret lathes, shapers or planers.



It comprises eight interchangeable high speed circular tools, accurately ground, with the hub fitting snugly into a counterbored holder.

Hub of the circular tool can be adjusted without disturbing the work after the tool is set up. The holder is of alloy steel, carefully heat treated.

The present method of turning a radius is to grind a tool by hand to the required radius and then check with a

Little ad! BIG SAVING!

Clip up to 50% off your power costs by installing Remco Motor Drives on your present machine tools. Changeable from one tool to another, not built special. Adjustable motor base takes ANY reasonable size motor—new, or USED. Saving on belting alone frequently pays for a complete Remco installation. Low installation cost. Write! Remco Products Corp., State and R.R., York, Pa.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

gauge. This is inaccurate and costly as the mechanic spends considerable time on the job.

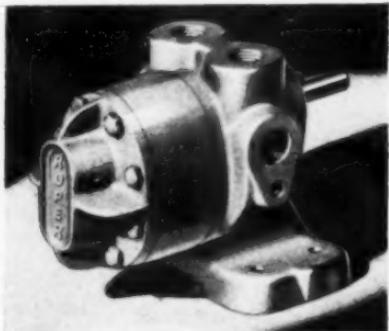
The circular design assures long life as the entire circular edge can be used. The cutting angle is designed to cut a smooth and free surface. The following Radii can be turned with this set: — $5/16"$, $3/8"$, $7/16"$, $1/2"$, $9/16"$, $5/8"$, $11/16"$ and $3/4"$. Holder is $5/8"$ by $1\frac{1}{4}$ " and length overall is $5\frac{1}{2}$ " to $7\frac{1}{2}$ ".

The complete set of eight tools, holder and wrenches is conveniently fitted into a wooden block as shown.

For complete information address the Forest City Bit and Tool Co., Rockford, Ill.

Roper Offers New Pumps

A new line of Roper rotary pumps is announced by the Geo. D. Roper Corp., Rockford, Ill.



Containing over 7,000 different units, this new line includes pumps of 1, 3, 5, 10, 15, 20, 35, 50, 75, 100, 150, 200,

Sanding and Polishing Machines



Portable
Electric
Disc and
Oscillating
Types.

Send for circular
THE NEDCO CO.

87 Rumford Ave., Waltham, Mass.

New

HEAVY DUTY MODEL C Magazine Feed Power Screwdriver



A rugged production machine built to handle tough assembly jobs.

Drives cap screws up to 60 foot pounds tension.

Capacity from $\frac{1}{4}"$ to $\frac{5}{8}"$ cap screws up to $2\frac{1}{4}"$ long. Also standard machine screws, wood screws, hex or square headed pipe plugs, and special screws.

We also manufacture hopper feed screwdrivers for screws ranging from No. 4 to $\frac{1}{4}"$ diameters; also motor driven hoppers for feeding screws, screw blanks, pins, rivets, nuts, flat washers, and other small parts.

*Write for information.
Send samples for production estimates.*

**DETROIT
POWER SCREWDRIVER CO.**
5363 Rohrs Avenue, Detroit, Michigan

BURR KEYSEATERS

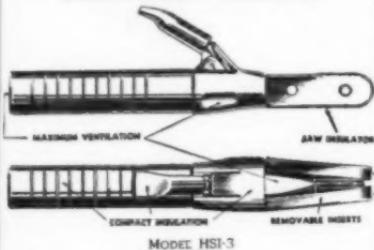


Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work. Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON
429 Kent Ave., Brooklyn, N. Y.

NEW HOUSTON SUPER GRIP ELECTRODE HOLDER



Houston Money Saving Advantages:

- 1-No obstruction.
- 2-Perfect balance.
- 3-Complete insulation.
- 4-Parallel action jaws. 96 Copper Alloy.
- 5-Replaceable parts plan.
- 6-Both jaws carry power.

CULLMAN SALES CO.
156 Temple Ave. 154 Nassau St.
Detroit, Mich. N. Y. C.

300, 500, 750 and 1000 g.p.m. capacities at speeds up to 180 r.p.m. and against pressures up to 1000 lbs. per square inch. At present 21 different drives and mountings are available, ranging from ordinary foot, hub and flange mounting heads to complete bedplate units for direct motor drive; gear reduction; flat or V-belt drive.

An outstanding feature emphasized is "hydraulic balance." It equalizes internal pressure at all points and absorbs shock or thrust from power end of drive shaft.

Other features include choice of spiral, spur or herringbone gears; conventional packing box, spring loaded packing box or mechanical seal; sleeve or roller bearings; built-in or external relief valve; eight different piping arrangements.

KUTMORE HIGH SPEED E

Adjustable Hollow Mills with
Two-way Micrometer Adjustment
Cutting capacities up to $2\frac{1}{2}$ ".
Ask for Catalog No. 12.



Reisinger Mfg. Company
837 Lake Ave., ROCHESTER, N. Y.

SEVERANCE

TUBE BURRING CUTTERS ARE
DESIGNED EXPRESSLY FOR THE JOB

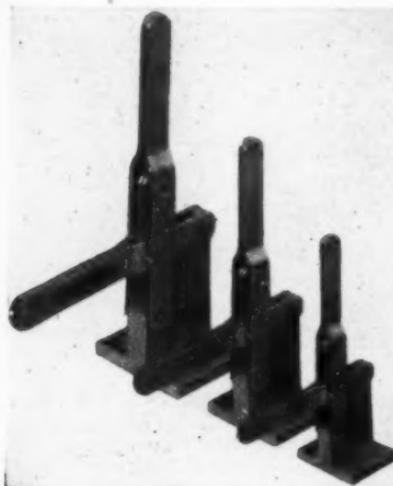


Severance Tube Burring Cutters burr or chamfer tubing both inside and outside in one operation. In a shearing cut which forces the chips out and prevents loading, these cutters quickly and easily finish tubes in sizes from $1/16$ " O. D. and up.

Submit your tube burring, reaming, chamfering and end sizing problems to our engineers and ask for Bulletin 12T.

SEVERANCE TOOL MFG. CO.
1510 E. GENESSEE AVE., SAGINAW, MICH.

K-V TOGGLE CLAMPS



THE MODERN WAY TO HOLD PRODUCTION PARTS IN JIGS, DIES AND FIXTURES. 25 TYPES IN STOCK.

NEW SERIES NOW AVAILABLE WITH SOLID TEE BASE OF CAST-STEEL.

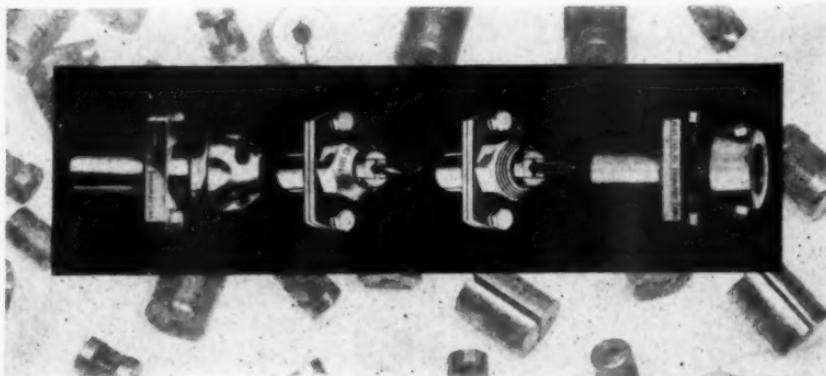
PRICES

KV-110	\$3.40	{	Net Each
KV-250	2.97		
KV-220	2.12		
KV-210	2.34		
KV-200	1.70		
KV-190	1.70		

ASK FOR CATALOG No. 4

KNU-VISE Inc.
6436 CASS AVE.

DETROIT, MICH.



A Blackout for Bushings—

How many times have you wished that you could line up and adjust your drills, taps, or dies without having to use bushings? The floating feature, found only in ALCO Tools, enables you to make that wish come true. The adjustment is simple, speedy and positive. Absolute concentricity is assured—on old or new machines. Broken drills and taps are reduced to a minimum; also expensive rejections on account of imperfect holes or defective threads. And, since no bushings are required with ALCO Drill Chucks or Tap Holders, your bushing headaches become a thing of the past. Write today for full particulars or that we have our representative in your locality call on you. **ALCO Tool Co., 835 Housatonic Ave., Bridgeport, Conn., U. S. A.**

ALCO TOOLS

EFFICIENT

A Small Universal Rectifier

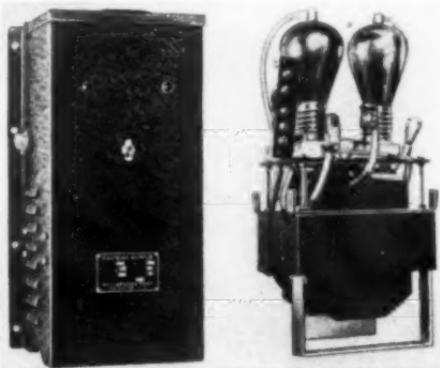
An economical means of converting a. c. into d. c. for operating five or six of the average tool room magnetic chucks, or other d. c. equipment, is provided by the model CR-6 rectifier, offered by the Mellaphone Corp., Rochester, N. Y.

Compact in size, the rectifier has a d. c. output of 660 watts ($\frac{3}{4}$ h. p.). It is claimed to withstand a 100% overload for five minutes without harm, thus making a convenient source of d. c. for motor operation where starting current is high.

Two inexpensive mercury vapor type tubes are used to full wave rectify single phase a. c. Internal construction of the tubes is said to prevent filament sag.

Since the rectifier contains no moving parts, no maintenance or attention is required.

A. c. and d. c. connections are made by means of a terminal board inside

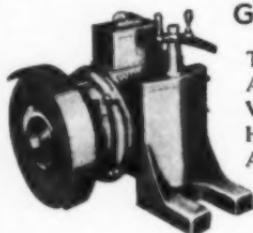


the hinged cover. An "off-on" switch is provided, and red and green jeweled pilot lamps indicate when the current is "on."

Size is $7\frac{1}{2}'' \times 5\frac{1}{2}'' \times 16\frac{1}{2}''$ and weight 26-lbs.

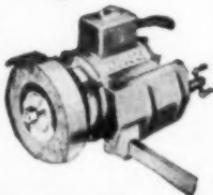
A larger model is available which will operate from a three phase a. c. 220 volt line, giving an output of 10 Kw. at 230 volts d. c.

WODACK GRINDERS



Tool Post
Angle Plate
Vertical and
Horizontal
Adjustment
7 Types

Extension for
internal grind-
ing. Full ball
bearing. Air
cleaner. Also
other types of
lathe grinders,
and portable
hand grinders.



Send for Bulletin 393.

Wodack Electric Tool Corp., 4629 W. Huron St., Chicago, Ill.

The Index Master

Here is an index, layout and inspection fixture that combines accuracy and speed. The makers assert that model makers, toolmakers and machinists will find it as essential as the carpenter finds his miter box.

The fixture comprises an angle iron with a hardened, ground and lapped bushing, fitted in the exact center. On each side, the angle iron is cut away, forming steps where hardened, ground and lapped guide plates are fastened. These plates are parallel to both the center bushing and base of the angle iron. At top of the angle iron another hardened, ground and lapped bushing is located $3.500''$ from the center

THE PRECISION UNIVERSAL TOOL HEAD

Brings all adjustments under absolute micrometric control of the operator at all times and all speeds **without stopping tool or machine.** It is the fastest and most accurate boring tool in existence. But more than that, it is truly universal. It faces, counterbores, turns outside diameters, mills, undercuts, recesses, backfaces, trepanns and does a limitless range of "headache" jobs utterly impossible with wrench-adjusted "offset" boring tools because such tools cannot be cross-fed or adjusted while running.

Send for bulletins and additional information.

REMOVAL NOTICE!

THE PRECISION TOOL COMPANY

ANNOUNCES ITS REMOVAL FROM BRIDGEPORT, CONN.

To BROOKLYN, NEW YORK

Send All Correspondence, Inquiries and Orders to

THE PRECISION TOOL COMPANY

P. O. BOX 155, BROOKLYN, NEW YORK

**ADJUSTABLE
While Running!**



Absolutely Different

Cable Address:

PRETOOL - NEW YORK

Telephone: MAIN 4-1064



The NILSON Tilting Wire Reel Helps Conserve Your Energy!

Lost motion, false motion and unnecessary motion all cost money. Only a little at a time perhaps, but over the period of a year, the total would be impressive. Why not save this?

Useless motion also represents a loss. Lifting heavy coils of wire wastes time and energy. Why not let NILSON save this too?

A foot lever is tripped, the guards removed, a coil of wire slid upon the carrier, the guards replaced and set screws tightened, an easy lift, and the counter-balancing weight does the rest, bringing the tilting section to a vertical position, ready to feed the wire into the machine.

Send today for Bulletin No. 51 and learn how you save in other ways too.

The A. H. NILSON Machine Co.
BRIDGEPORT, CONN., U.S.A.



Tapping As Fast As You Can Drill . . .

with the A. M. Sensitive Tapping Machine . . . from the smallest and finest up to $\frac{3}{16}$ " diameter in steel and iron—and up to $\frac{3}{8}$ " in softer materials. A modern unit that within its capacity, will take all the punishment intense production can inflict.



*Write TODAY for
this sure solution of
your small
tapping
problems.*

A. MUEHLMATT DIVISION
OF
THE HAMILTON TOOL CO.
HAMILTON, OHIO



GRIPOMATIC PULLERS

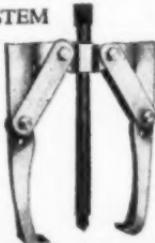
**Capacities 5 to 40 TONS
For PLANT MAINTENANCE**

The patented gripping feature prevents slipping, avoids damage and simplifies work in close quarters. Alloy steel—fully Guaranteed.

OTC PULLING SYSTEM
includes many sizes and types of Pullers and Pushers for installing and removing gears, bearings, wheels, pulleys, sleeves, shafts.

Special Pullers designed and made for special needs.

Write for catalog H.



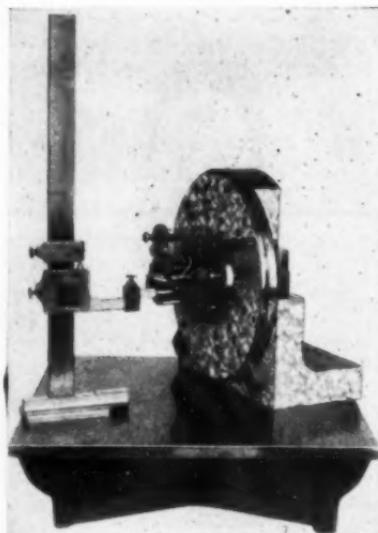
OWATONNA TOOL CO.

355 CEDAR ST., OWATONNA, MINN.

bushing and on its vertical center line. This is the index bushing.

The vertical index plate revolves on the bearing stud fitted in the center bushing of the angle iron, or it can be clamped in any position. Outside rim of index plate is graduated by degrees over the entire circumference. Eight index holes, with hardened, ground and lapped bushings, are located 45° apart and have the exact center distance, not only from center bushing, but also from each other.

The plate of the standard Index Master shown is eight inches in diameter.

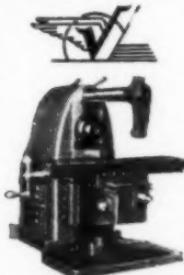


On special order, 24" or 30" sizes can be supplied.

The device is extremely versatile in application. Irregular shapes and a wide range of sizes can be handled, as the Index Master can be raised on blocks and clamped to permit handling of cumbersome shapes.

A new bulletin is available showing use of the device on typical jobs. Address The Pump Engineering Service Corp., 12912 Taft Ave., Cleveland, O.

BE SURE TO CHECK (✓) THE *Vernon* LINE BEFORE YOU BUY YOUR Mill or Shaper

**THE VERNON MILL**

Features: Timken tapered roller bearings, Hand Scrapped Ways, Variable Drive for correct spindle speeds, Small box type knee, Micro dials, Ground spindle, 3 T-slots in table, Power feed, Table size 4-11/16" x 20".

Rugged Modern Design
High Precision
Versatility
Low Cost

Would you send a man to do a boy's work?! Of course not! You don't let a high salaried executive do the file clerk's job, or tie your chief engineer to a broom handle. Then why use machines costing thousands of dollars to do small or medium sized jobs? Install a **VERNON** mill or a **VERNON** shaper and produce precision work with low initial outlay and low operating cost!

*Some exclusive territories
still available.*

**11" VERNON SHAPER**

Features: Helical gears for smoothness and power, Universal table, Swivel vise, Variable Drive, Automatic Feed, Hand scraped ways.

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MACHINERY MANUFACTURING COMPANY

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OHIO WELDING NUTS AND BOLTS



H-1



G-2



H-2



G-3

If you use resistance welding investigate the savings and improved design made possible by Ohio Welding Nuts and Bolts.

For information and samples write to

THE OHIO NUT & BOLT COMPANY
616 Front Street, Berea, Ohio

Champion Expanding Mandrels

$\frac{1}{2}$ " to $6\frac{1}{4}$ "

Efficient—Dependable—

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THE WESTERN TOOL
& MFG. CO.

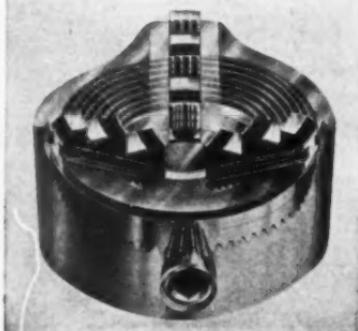
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TAKE HEAVIER CUTS
USE GREATER SPEEDS

WITH

TAYLOR CHUCKS



This is the only chuck with all moving parts hardened and ground. Lasts years.

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GOOD NEWS! for DIE MAKERS

Transfer Points Eliminate
Guesswork in Die Making

There's no chance for error when you use transfer screws as markers in setting dies. Points are of uniform height above hex base. Six accurately made and hardened screws nest in a special holder with hex wrench tip. Made in $\frac{1}{4}$ " to 1" diameters.

3/16"	\$1.50 per set	5/16"	\$1.25 per set	7/16"	\$1.40 per set
1/4"	1.20 "	3/8"	1.35 "	1/2"	1.50 "

HEIMANN MFG. CO.,

URBANA, OHIO

Stow Acquires Whirlflex Rights

All rights to manufacture and sell Whirlflex, a mechanical cleaner for piping in paper mills, have been acquired by Stow Mfg. Co., Inc., 30 Shear St., Binghamton, N. Y. The transaction was negotiated with the Whirlflex Company, Buffalo, which holds all patents to the device. Stow is now in production on Whirlflex and is planning a promotion program in various countries throughout the world, excepting Canada.

Whirlflex employs a flexible shaft drive to revolve the cleaning member of the device. In the field of flexible shaft power application, Stow has been prominent since 1875.

New Plant for Shim Company

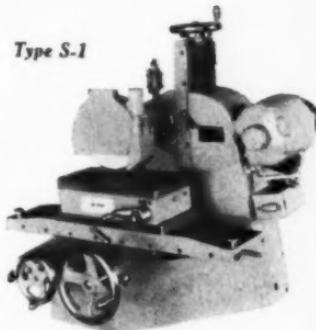
The Laminated Shim Co., Inc., Long Island City, N. Y., manufacturers of Laminum shims, shim stock and small stampings, announce that work has started on a new plant located at Stamford, Conn. The new building is to be a modern, one-story manufacturing plant of about 30,000 square feet floor space. Provision is made in the structure for new general offices. It is expected that the plant will be completed early in June of this year.

The Company officials say that their need for larger manufacturing space is acute, and that they need it all on one floor. They also point out that due to the type of service business in which they are engaged, it is important that they be as near as possible to sources of raw materials.

The S-1 Surface Grinder —another BERGRAM Precision Grinder

1. Precision Spindle—Sturdy Construction.
2. Sensitive table travel.
3. Permanent magnetic chuck with grinding surface 5"x10"—no wires or generators. Electromagnetic chuck can also be furnished.
4. Interchangeable pulleys to compensate for wheel wear.
5. For groove grinding an adaptor is furnished for mounting small wheels.

Type S-1



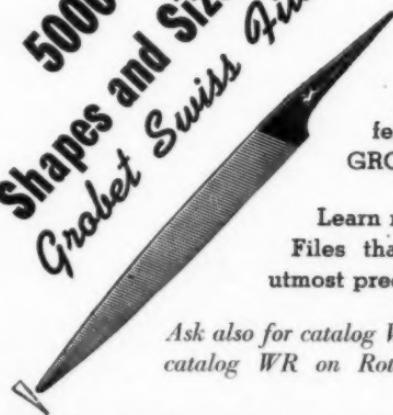
Bergram Mechanical Engineering Co., Inc.

"Specialists in Grinding Machinery"

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The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss files.

Learn more about these chrome Steel Files that have won a reputation for utmost precision and durability.

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GROBET FILE CORP. of AMERICA

• 3 PARK PLACE
NEW YORK CITY



Reamer and Cutter Grinder

Here is one machine that is still within the range of your pocketbook



Grinding a Hollow Mill Cutter

A machine in a class by itself

With this Universal Tool you can do any tool grinding job within its range, including Carbolyt tools, at a big saving in time.

Ask for bulletin No. RG393H.

K. O. LEE & SON CO.

Aberdeen, So. Dak.

"practical tools for practical men"



Rehtron Photo-Electric Set

"Electric eye" experiments will be facilitated by the new kit offered by the Rehtron Corp., 2159 Magnolia Ave., Chicago, Ill.



The set includes a photo electric robot relay, a long range light source with invisible beam infra red filter and a signal switchboard equipped for audible and visible signal demonstrations. A 24-page instruction book with diagrams describes many practical applications and industrial experiments. The set comes all assembled and ready to plug into any 115 volt 50-60 cycle outlet, permitting nearly all commercial applications of photo electric equipment to be demonstrated or duplicated. No batteries are required.

The idea behind the set is that many are not very familiar with photo electric applications. This sensitive, stable, low cost kit is designed to acquaint laymen with the possibilities of "electric eye" operation and control. Experimental hookups can be applied to the solution of specific problems.

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ROTARY FILES
ground from the solid



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the most complete catalog of its kind, illustrating hundreds of rotary files hand cut, milled cut, ground from the solid; also diesinkers' burs.

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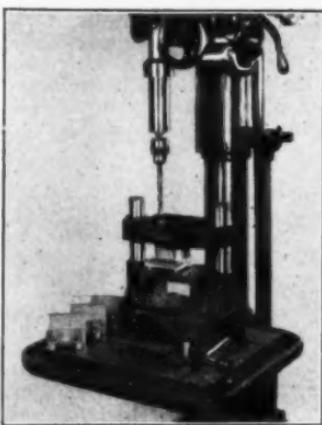
WITH

ESCO DRILL JIGS

Many manufacturers are finding it increasingly difficult to accept more business, due to limited capacity.

ESCO DRILL JIGS, with their quick-clamping feature . . . minimum of loading and unloading time . . . will assist you to speed up your production to make room for more business. Drilling, boring, reaming, and milling operations done in ESCO DRILL JIGS will increase your capacity, and reduce your cost per piece.

In the illustration, the two post holes in the aluminum base casting for an Esco Mijit Jig are being drilled and bored. The center distance and the diameter of the holes is easily held to a plus or minus .0002 by using an ESCO STANDARD JIG. This same fixture is also used for drilling and boring the post holes on all Mijit Jig castings, each of which have varying center distances. By interchanging adapters this same jig is used to drill and counterbore the top plates. The accuracy and uniformity of the center distance for these holes makes any jig base or top plate interchangeable.



This kind of accuracy and lower cost per piece may be applicable to your own shop . . . and make it possible to increase your capacity. *Send us your blue prints for preliminary survey without obligation.*

Esco Engineering & Sales, Inc., 4855 Fourth Ave., Detroit, Mich.



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LOWER COST AUTOMATIC MACHINE CONTROLS of WIDER RANGE.

Pneumatically controlled operating cycles provide manual operation versatility plus automatic operation speed. Those problem processes that you have been unable to remove from the pain-in-the-neck class can very probably be smoothly yet swiftly effected by T-J Pneumatic Controls. Send description of required cycle of operations, time of operations and present methods too, please. We will gladly make recommendations. Bulletin RC-4 will show you typical installations and standard units.

this is a TOMKINS-JOHNSON product

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JACKSON, MICHIGAN — AGENTS IN PRINCIPAL CITIES

ALL ALLOY PORTABLE SHEARS

FULLY GUARANTEED

Two Sizes

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to $\frac{3}{8}$ " steel plate.
Special Blades for shearing stainless steel.

BREMIL MFG. CO.
1720 Pittsburgh Ave., Erie, Pa.



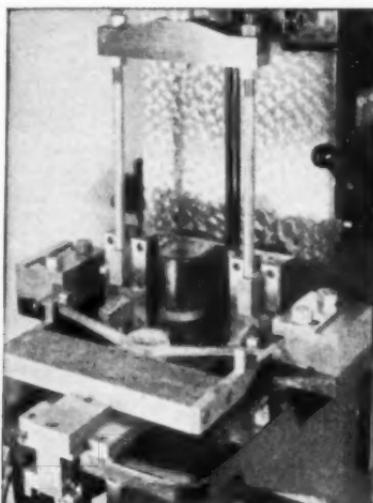
Air CYLINDERS and VALVES

We've been making them for our own machines for 25 years. Exclusive design...without tie-rods. More compact! Heads removable without disassembling entire unit. All cylinders cast iron, machined and honed. All diameters, lengths and mountings. Hand valves; foot pedal valves; electric operated valves and our own exclusive design automatic self-operating valves. *May we quote you on your requirements?*

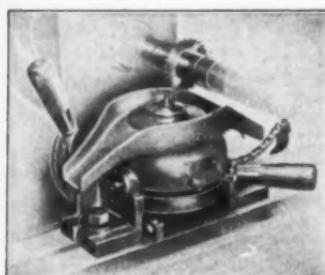
The Bell Machine Co. 61 Jackson Dr. Oshkosh, Wis.

Testing Steering Spokes

A novel use for a hydraulic broaching machine was developed recently by Colonial Broach Co., Detroit, for a prominent motor car manufacturer. It was desired to test, in production, the strength of steel hub core and spoke castings for steering wheels, "straightening" the spokes at the same time.



For the operation, a standard Colonial open side utility broaching machine was selected. It is completely hydraulic and automatic in operation.



Mill Over 1,000 Parts Per Hour

WITH THE

NEW Dearborn Automatic Chucking and Indexing Fixture

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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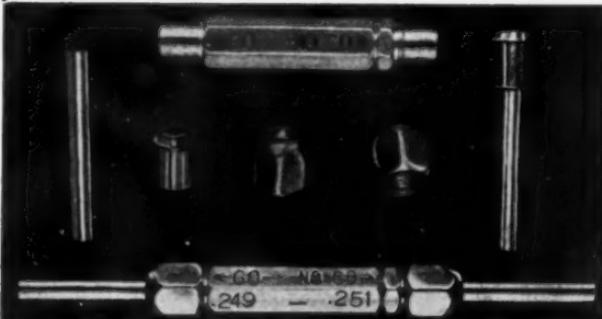
*Built for exceptional
SERVICE*

Engineered for super performance and long life, you'll find in the New Rockford Presses, every modern advance—Chrome Nickel Crankshaft, Hard Bronze Bushings, Timken Bearing Back Shaft, to mention just a few.

There's a model for every requirement—and all are backed by more than 30-years' experience in press building. *May we tell you more—and send a copy of our complete catalog?*

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Precision lapped
to the brilliance
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Tolerance for
sizes .030" to
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Gauging members can be turned on opposite ends when worn, giving plug 100% more life. Note the new aluminum handle and new brass collet construction.

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Precision lathes for doing most accurate turning, drilling, milling, threading, filing, polishing, in the tool room or in production.

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Motor
Driven
Hand
Feed
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Grinder

For Small
Precision
Work
5x12" Table
6x $\frac{3}{4}$ " Wheel
 $\frac{1}{2}$ HP Motor

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Grand Rapids Michigan

and is provided with a vertically adjustable fixture table. The steel steering wheel core and spoke casting is merely laid in the fixture, ends of the spokes being supported right and left, while the hub at the center is also supported on hardened steel plates.

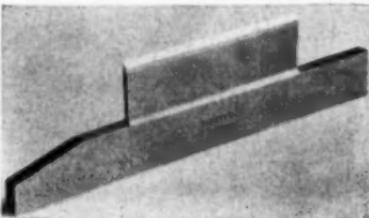
Starting the machine causes the fixture slide to shuttle back into the fixture automatically. The ram then moves downward. Two notched bars carried from the ram cross-head bear against the spokes, midway between their ends and the hub, thereby bending the spokes. When the limit of the desired travel has been reached, automatic stops trip an operating valve, and the return stroke of the ram causes the spokes to be bent back into the correct position.

Both downward and upward strokes of the ram are adjustable by means of screw threads and nuts.

The machine has a capacity of four tons and an 18" maximum stroke length. Actually only about 2" of stroke are used in this case. With this set-up, 300 assemblies can be tested and straightened per hour.

Tantung Centerless Grinder Blades

Centerless grinder rests for any type of machine or grinding operation, faced with a tough, slow wearing alloy, are obtainable from Fansteel Metallurgical Corp., North Chicago, Ill.



The hard facing, Tantung, is a patented Fansteel alloy composed of hard particles of tantalum and tungsten carbide, uniformly distributed and firmly embedded in a strong, tough matrix. It is stated that Tantung differs from

**Keep Grinding Costs At A Minimum
WITH THE
REID
NO. 2-A HAND-FEED
SURFACE GRINDER**

Available With Motor In Base, Counter-shaft, Or Motorized Spindle

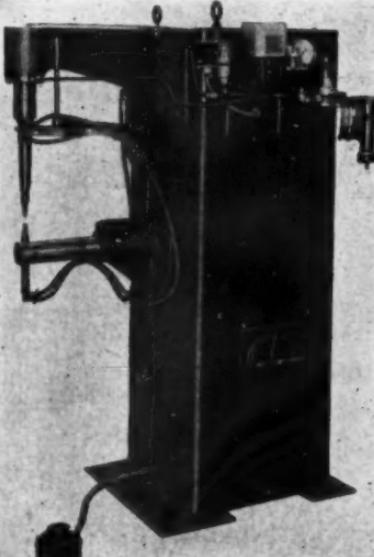
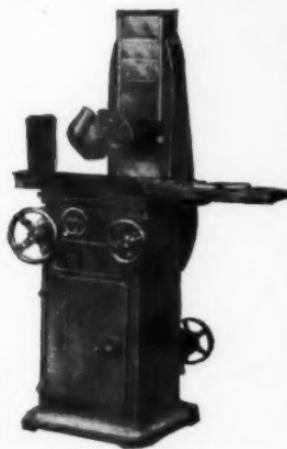
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Reid Brothers Co., Inc.

EST. 1900

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a complete line of dependable and efficient resistance welders, ranging from the 5 K. V. A. Bench Type to 1000 K. V. A. air or hydraulically operated machines. Also Seam Welders and Gun Welders. The 50 K. V. A. Heavy Duty Press Type unit is shown.

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Acro Welder Mfg. Co.
1570 So. First St., Milwaukee, Wis.



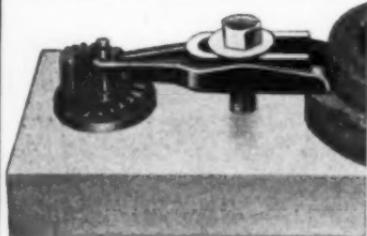
SAVE Labor and Time

Eliminate heavy lifting. Cut handling costs. Table swivels and locks in any position. Can be varied $15\frac{1}{2}^{\circ}$ by slight foot pressure, leaving operator's hands free. Engineered and built by tool engineers, experienced in production of special machines, dies, jigs and fixtures for exacting requirements.

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K-O ADJUSTABLE U CLAMPS



Rear of clamp quickly adjusted to height of work to be clamped by turning step elevation base. U clamp forgings scientifically designed to give maximum strength for their size and weight. Three point contact insures uniform pressure. Made in six sizes—three different styles. Cut shows our No. 4 with a $\frac{3}{4}$ bolt. This size sells for \$1.25 with discounts for quantity.

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K-O PRODUCTS CO.
Benton Harbor, Michigan

conventional hard facing materials in that the presence of tantalum carbide not only contributes to hardness, but imparts a peculiar lubricating characteristic which improves resistance to wear. The alloy successfully withstands the severe service of centerless grinding operations, outlasting the hardest types of steel blades by a wide margin.

The Tantung facing, which is made in bar form, is firmly affixed to the steel supports by a special brazing process perfected in the Fansteel plant. Complete blades are manufactured to specification. Tantung facing is applied to existing blades furnished by users, or Tantung bars are obtainable for those equipped to do their own brazing.

Worn out blades can be reclaimed by application of Tantung facings, and when the Tantung facing itself finally wears out, a new facing can be applied, thus giving grinder blades indefinite life.

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MILLING MACHINES

Make Fast Work of Small Jobs

Motor
Driven

Timken
roller or
ball bear-
ings to
spindle

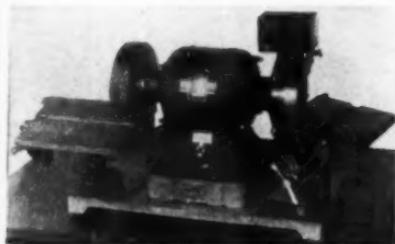
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FOR CARBIDE TIPPED TOOLS THE ALL IN ONE TOOL GRINDER

Complete with ——



TWO WORK TABLES

ONE 6"x1½" GRINDING WHEEL

ONE 6"x½" FACE DIAMOND
SET LAP

ONE PROTRACTOR

110 VOLT, 60 C. A. C. MOTOR
1750 R. P. M.

PRICE COMPLETE.....\$108

220 V. 60 C. 3 PHASE MOTOR \$5.00 extra

230 V. D. C. MOTOR \$10 extra, PEDESTAL IF DESIRED \$20 extra

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Harrison, N. J.



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Where else can you obtain 16 different kinds of heat-treated, alloy steel screws—all standard? Or any other type made to your specifications, and with Mac-it's quarter century of experience in making top quality products?

Mac-it's are the only complete line of heat-treated alloy steel screws on the market. And they're Good!

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Shear Cut

END MILLS

You Save Time, Trouble and Money by specifying PROGRESSIVE Shear-Cut End Mills. They cut faster, easier and leave the smooth finish you want.

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Speedy, economical tools for finishing, lapping and polishing small parts. Hand or foot operated collet, sizes from $1\frac{1}{64}$ " to $1\frac{1}{4}$ ". Hand, foot or air operated 3-jaw chucks. 1, $\frac{1}{2}$ or $\frac{1}{4}$ h. p. A. C. 2-speed motor.

Send today for circular 380

SCHAUER MACHINE CO.
2064 Reading Road. Cincinnati, O.

New Cartons for Barnes Saws

The man in the tool crib who has lost his temper and some hide fighting a snarling, twisting, kinking length of band saw stock will welcome a new method of packing, adapted by W. O. Barnes Co., Inc., Detroit, Mich.



Lengths of metal cutting band saw up to 100 feet, in widths $\frac{1}{2}$ " and under, are now delivered in flat cartons, with one end of the coils readily accessible. The tool room foreman, asked for a 10-foot length, pulls the band saw from the small opening. He cuts off the length, notes the amount on the perpetual inventory record on the carton and replaces the carton in stock.

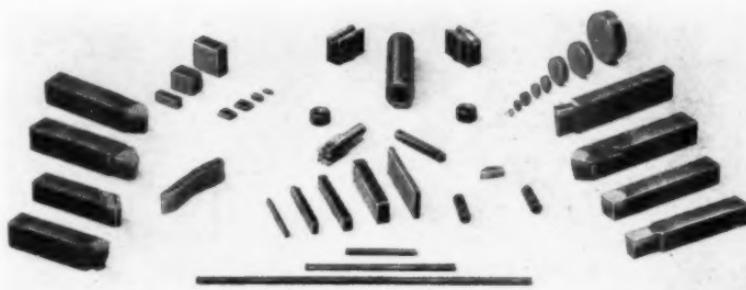
Littell Safety Feeders and Pickers

A recent addition to Littell products which include roll feeds, automatic centering reels, etc., is a new line of safety feeders and pickers announced by the F. J. Littell Machine Co., 4153 Ravenswood Ave., Chicago, Ill.

The safety feeder is used for picking up flat-surface materials and feeding them into punch presses, keeping operator's hands out of the "danger zone." Besides the safety factor, it is said to simplify and accelerate production through faster, more efficient handling.

It comprises a pistol-grip handle and a single or double vacuum cup attached to an extension. When trigger is pulled, a vacuum is provided between the cup or cups and materials handled.

TUNGSTEN CARBIDE PRODUCTS



Above you see Circle Tip Tools
Whose value is equal to jewels
For they save you time
And money you'll find
So write for our booklet on tools

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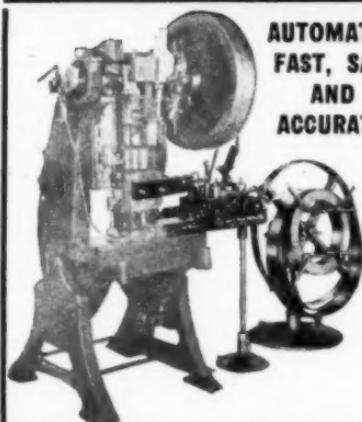
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40-44 HEDDEN PLACE

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WITTEK ROLL FEEDS

FOR ANY MAKE AND SIZE OF PUNCH PRESS



**AUTOMATIC,
FAST, SAFE
AND
ACCURATE**

Wittek Roll Feeds are made in various models to meet any requirement in feeding all types of coil stock to punch presses. Each unit is flexible in function and application capable of feeding stock in various thicknesses and widths up to the maximum width of the feed rolls and in lengths from 0 inches to 24 inches per stroke of the press.

Made in single roll, double roll, (push-pull) and compound models with built-in straightener to feed from right to left, left to right, front to back and back to front. Easily installed on any make or size punch press without alteration.

Wittek Automatic Roll Feeds provide a new and simple method of automatic feeding. They combine high speed and accuracy with low operating and maintenance cost, save dies, reduce scrap to a minimum and make automatic feeding practical on short runs.

WITTEK REEL STANDS

6 models—a reel stand for every purpose. Handles any size of type coiled stock, even steady run of stock to the feed and assures maximum production by eliminating looping, tangling and backlash.

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PYRO RADIATION PYROMETER



STOP spoilage. Get exact temperature of work in furnace. Direct reading; no calculations; no maintenance expense. Strictly automatic. Range 1000-3600° F.

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As Cutter Specialists since 1919 we are able to offer the highest quality and service at attractive prices.

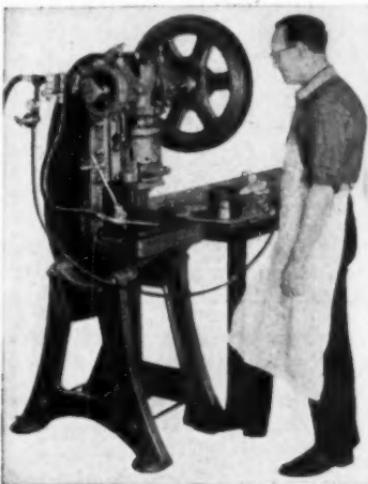
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Few Territories Open.

QUALITY TOOL WORKS
WAUKEGAN, ILLINOIS

The method of obtaining vacuum is new, as the picker is attached to a compressed air line and only requires a pressure of from 20 to 45 lbs. A reducing valve and gage are supplied. Very little air is used as the aperture is small.

Work performed extends to the picking up of sheet steel, brass, aluminum, glass, etc. It takes hold of a wet, dry or oily surface. For handling material



with a hole in the center, the double-cup Feeder is used. The exhaust air coming from the tip can be utilized to blow out dirt or chips from the die.

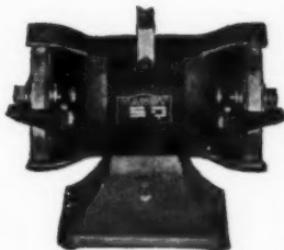


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VIMCO LIGHT means better sight—better work—higher production—fewer mistakes—less chance of accident—and relief from headaches and fatigue.

Vimco offers a complete line of lights for any kind of a machine tool. The illustration shows a Vimco Light installed on a Metal Band Saw Made By The Tannowitz Works. Write for details and prices.

VIMCO MFG. CO., 109 CHENANGO STREET,
BUFFALO, NEW YORK



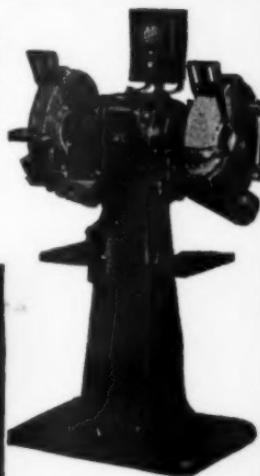
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A complete line—6" to 12"; Bench and Pedestal Types; All Heavy Duty, Ball Bearing; Price range, \$20.50 to \$175.00.

1 YEAR GUARANTEE.

ABOVE, No. 548, 1/4 H.P. \$ 20.50
AT RIGHT, No. 121, 2 H.P. \$175.00

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.



BALDOR BALL BEARING GRINDERS

NICHOLSON CONTROL VALVES

are made in two, three and four-way types for air, oil, water, steam, gas, etc., pressures to 5000 lbs. Style E is a general purpose valve for pressures to

300 lbs. Various metal combinations to suit any medium. Style J is for air and oil only, pressures to 125 lbs. Style H is a balanced hydraulic valve for pressures to 5000 lbs. We also manufacture foot, solenoid and motor-operated valves.



Style J



Bulletins on request.

OTHER NICHOLSON PRODUCTS: Mandrels, Arbor Presses, Flexible Couplings, Steel and Stainless Steel Floats, Steam Separators, Steam Traps, Air Separators, Air Traps, Air Vents, Etc.

W. H. Nicholson & Company
117 OREGON STREET WILKES-BARRE, PA.



**ADDS
YEARS
TO
MACHINE
SERVICE**

Get all the facts as to how this new HEAVY - DUTY L - R Type H Coupling handles real heavy duty jobs. Non-lubricated type with exclusive L-R features for better service at lower cost. New free catalog ready.

Write.



TYPE H

Lovejoy Flexible Coupling Co. 5926 W. LAKE ST.
CHICAGO ILLINOIS



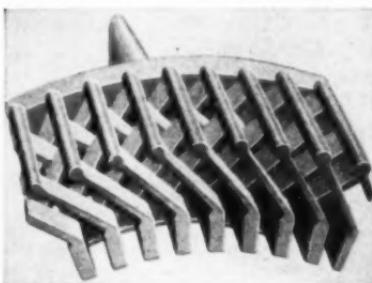
The NEW BRITAIN Universal Vise swivels 360 degrees horizontally, and 100 degrees vertically.

Write for further information.

NEW BRITAIN TOOL & MFG. CO.
NEW BRITAIN, CONN., U. S. A.

G. E. "Valv-Amp" Rotor

Offering the advantage of longer motor life with less maintenance, a new type rotor construction announced by General Electric makes possible the use of cast-aluminum rotors in the larger sizes of double-squirrel-cage motors for high-starting-torque, low-starting-current service. Called the



"Valv-amp" rotor, it makes use of a unique shape of rotor slot and a special method of assembling rotor punchings to control the flow of starting current. As a result, without the use of a switch or other moving parts, current is permitted to flow in the outer squirrel-cage when the motor is started, thus producing high-starting torque. Then, when the motor comes up to speed, current is allowed to flow through the entire rotor "winding," resulting in excellent running characteristics.

Of the two conventional methods of double-squirrel-cage-rotor construction, i. e., casting the conductor bars and short-circuiting rings integral or joining them by brazing, the former

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(*F. o. b.
Minneapolis*) DIE FILER**



A dependable, precision tool that will soon pay for itself.

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CLUTCH OR CONE DRIVE

*Our High Speed Tappers
are Super-Sensitive for
Small Tapping*



USEFUL In Any Modern Shop

This sturdy 36"x48" Milwaukee Surface Plate is of semi-steel construction, accurately machined, provided with cross ribs every 10 $\frac{1}{2}$ " for rigidity, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Shipping weight 1100 lbs.

We also make larger and smaller plates either with planed or scraped surfaces which ever is desired.

Write today for full information.

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Include both Noiseless Spinning and Vibrating Hammer types of machines—also Vertical and Horizontal Multiple Spindle Spinning Machines.



Send unriveted samples with request for recommendation and quotation.

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REDUCES DIAMOND INVENTORY

CARBOLoy
DIAMOND DRESSERS
For Dressing All Grinding Wheels

Write for Catalog DR-3B

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method is by far the more satisfactory because it is a simpler operation, with smaller chance for human error, and results in a more compact, uniform product. However, until the Valv-amp development, it has not been practicable to cast double-squirrel-cage rotors in the larger sizes.

The Valv-amp development allows the construction of larger cast-rotor motors which inherently combine the advantages of the double-squirrel-cage motor, such as high-starting torque, low-starting current, and excellent running characteristics, with advantages of the conventional cast-rotor motor—simplicity of construction, long motor life, little maintenance, and permanence of electrical characteristics.

Jarvis Opens Chicago Branch

A new Chicago Branch Office with G. V. Ramstack in charge, has been opened by The Charles L. Jarvis Co., of Middletown, Conn.

The address is 1344 W. Washington Blvd., and the phone number Canal 3212.

A complete stock of Jarvis items and repairs will be carried including the numerous types of flexible shaft machines; Jarvis-Biax flexible shafts; self-contained shafts; hand pieces, accessories, tools; sanding drums, felt buffs, wire brushes, grinding wheels, hand and mill cut rotary files, routers, rasps, cutters, etc. All of these are illustrated in the new Jarvis Catalog "MST" which will be sent on request.

The line also includes the well-known Jarvis tapping equipment.

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NAME-PLATE
STAMPING
MACHINE

*Write for latest
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Dept. H.*

H. O. BATES

251-257 North
Broad St.

Elizabeth, N. J.

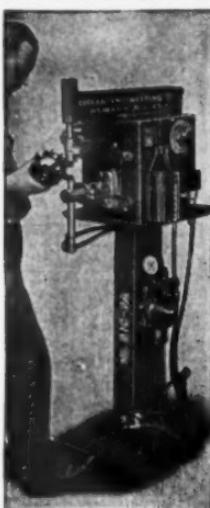
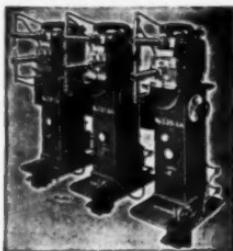
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No. 1

\$95.00

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CAN BE
REPLACED.



Investigate our NEW VERTICAL PRESS TYPE WELDERS. It's something NEW for precision work. CHAS. EISLER has over 50,000 SPOT WELDERS in daily use, from $\frac{1}{4}$ to 500 KVA.

We also make standard and special TRANSFORMERS of all kinds.

WE INVITE CONTRACT SPOT WELDING IN LARGE OR SMALL QUANTITIES.

A. C. Arc Welders from 100 to 400 Amps.
Please write to us for more information.

Kindly mention Hitchcock's Machine Tool Blue Book.

**CHAS EISLER
EISLER ENGINEERING COMPANY**

762 So. 13th St. (Near Avon Ave.)

Newark, New Jersey



MARSCHKE

The SELECTIVE SPEED BUFFER with independent spindle drive, as shown in this illustration, is made in three sizes for 5, $7\frac{1}{2}$ and 10 H. P. motors. It is only one of the several types and sizes of MARSCHKE BUFFERS.

The MARSCHKE LINE includes a wide variety of BUFFERS, FLOOR STAND AND SWING FRAME GRINDERS for the different conditions and different requirements of every plant in any industry.

Send for catalog showing machines with 10" to 30" wheels and 1 to 25 H. P. motors

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STANDARDIZED

Machined Steel Drop Forged Steel Semi-Steel

Headquarters for Standardized Die Sets, embodying many exclusive features and embracing more than 195,000 stock sizes and 46 different styles. A die service that is unsurpassed. Let us prove it!

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1810 So. Kilbourne Ave., CHICAGO, ILL.

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L & J

INCLINABLE POWER PRESSES

LOSHBOUGH-JORDAN
TOOL & MACHINE CO.
1625 STERLING AVE. ELKHART, INDIANA

Speedy Power Screwdriver

A new heavy duty magazine feed power screwdriver has been placed on the market by the Detroit Power Screwdriver Co., of 5363 Rohns Ave., Detroit, Mich.

The makers emphasize that the machine is rugged in construction, built to stand the strain of real power screwdriving, and designed to drive cap screws and other screws in assemblies that require maximum tension.

The machine is shown set up to drive $\frac{3}{8}$ " hardened cap screws in ring gear assemblies. These screws are all driven to 55 foot pounds tension and the user reports a production of one ring gear assembly per minute. This is fast, considering there are 10 screws to drive, in addition to the heavy assembly having to be placed in the fixture by the operator, and a lock washer inserted under each screw from tray attached to fixture.

The patented barrel type hopper is individually motor driven in order to get a uniform hopper speed, regardless

HOW MUCH



* A wonderful bed, a clean, quiet room, pleasant, efficient service, and a friendly atmosphere — these are what you get, and all you pay for, at the Madison-Lenox. No frills—just genuine comfort and consequently, genuine economy. An excellent location, with garage nearby.

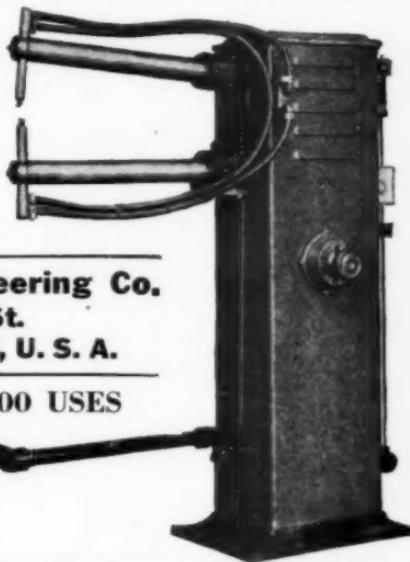
VERNON W. MCCOY, Gen. Mgr.

Detroit

HOTELS MADISON AVENUE AT GRAND CIRCUS PARK
MADISON and LENOX

DYER SPOT WELDERS

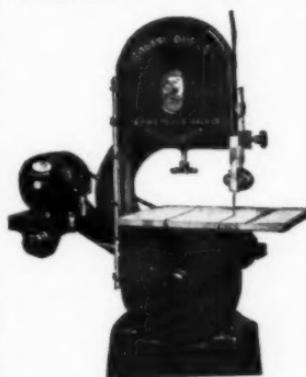
from
2½ KW to 35 KW
 Bench and Floor Type



Dyer Welder & Engineering Co.
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THE WELDER OF 1000 USES
For Sheet Metal
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Wire Products

RACINE Duplex Band Saw



Two Speeds— for cutting wood,
 steel, brass, copper, tubing, angles,
 templates.

The ideal all around machine for
 production shops, tool rooms, pat-
 tern shops, laboratories.

Accurate—Fast—Rugged. Modern,
 High Grade Construction.

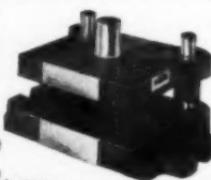
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RACINE TOOL & MACHINE COMPANY
 1754 STATE ST.

RACINE, WIS. U. S. A.

DANLY DIE SETS

Precision
Commercial
Special



Danly Machine
Specialties Inc.
2130 S. 52 Avenue Chicago

DANLY DIE MAKERS' SUPPLIES

ABRASIVE WHEEL DRESSERS

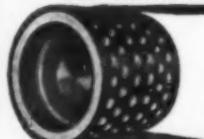


KEEP GRINDING WHEELS SHARP
AT LOW COST. SPECIAL DRESSER
FOR SURFACE GRINDER GIVES
HEAVIER CUT WITHOUT BURNING.

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377 CORNWALL ST.,
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NO BELT SLIPS WITH VACUUM CUP METAL PULLEYS



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30 Day Free
Trial Offer.

Solid and Split

Sizes 2" to 72" Dia.

Shut Off Expense Caused by Slippage
You Save Money on Every Installation

NEW LOW PRICED PRODUCTION LINE

SEE PART LIST
PRICES BELOW Send for List—On the Shelf

Dia.	Face	Price	Dia.	Face	Price
2"	"x2 1/2"	\$1.25	4"	"x4 1/2"	\$3.20
2 1/2"	"x2 1/2"	1.45	4 1/2"	"x4 1/2"	3.35
3 1/2"	"x3 1/2"	1.65	4 1/2"	"x5 1/2"	3.95
5"	"x3 1/2"	2.25	6"	"x5 1/2"	4.75

Increase
your
Production

Try one at our risk on your worst drive. You be the Judge.

VACUUM CUP METAL PULLEY CO., INC.
12536 Grand River Ave., Detroit, Mich.

of screwdriver spindle speed. Hopper is designed to eliminate any damage to motor or gears should foreign material get into it with the screws.

In addition to assemblies of the kind



shown, the machine is particularly adaptable for driving cap screws in pressure pumps, single cylinder engine heads, heavy duty valves, drain plugs, square or hex headed pipe plugs, pressure valves, and large wood screw jobs.

Production estimates will be given on sample assemblies submitted.

Welding Alloys and Fluxes

New alloys and fluxes for oxy-acetylene welding under the "Castolin" trade name are now on the American market. An outstanding feature is the lower range of welding temperatures required. This is said to prevent overheating and subsequent warping of welded parts. This should tend to simplify many jobs which were considered difficult. In repair work, the low temperatures at which binding occurs eliminates long preheating. Alloys in rod form are available for the steel, aluminum, brass and bronze industries.

Castolin "190" is for welding aluminum and its alloys, even in thin sheets. It flows at 930° F. and a tensile strength of 35,000 lbs. per sq. in.

Castolin "185" also called Bronzo-chrome, is for building up on steel, cast iron, copper, brass, bronze, etc. It flows porelessly at 750° F., and although its hardness is given as 230 Brinell, machining can be done easily. It is recommended for repairing broken or worn machinery parts.

Castolin "15" is for cast iron. It binds at 900° F., with a tensile strength of from 47,000 to 51,000 lbs. per sq. in.

Castolin "15" also for cast iron, binds at 360° F. Alloy "16" for

steel binds at 1470° F., with a tensile of 115,000 lbs. No. "18" is for copper, brass and extruded bronze and binds at 1600° F., with a tensile of 65,000 lbs. No. "210" for cast aluminum binds at 950° F., and No. "195" for die castings binds at 750° F.

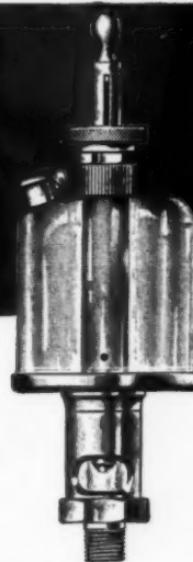
Castolin fluxes are furnished in paste or powder form.

These alloys and others are fully described in pamphlet C-31, mailed on request by Park Sales Co., 3 Park Place, New York City.

**OIL when
and as you
need it!**

GITS

**unbreakable
SIGHT GRAVITY
NEEDLE VALVE
ADJUSTMENT
FEED OILER**



Oil flow may be adjusted as desired, or completely shut off by adjustable needle valve. Modern, streamline, unbreakable bottle eliminates danger of broken glass in production.

Complete details on request.

GITS BROS. MFG. CO.

29 years of oil cup experience

1860 South Kilbourn Ave.

Chicago, Ill.



Write for catalog F.

Greenerd Arbor Press Co.
Nashua, N. H.

WYCO Offers New Models

A new line of flexible shaft machines has been added by Wyzenbeek & Staff, Inc., 838 W. Hubbard St., Chicago, Ill.

The Series 30 models feature four speeds—900, 1200, 2400 and 3600 r.p.m. The motors are mounted low, giving a low center of gravity and long V-belt's are used.



Model 32 utilizes a $\frac{3}{4}$ h.p. motor which swivels on base—seven feet of flexible shaft and No. 616 angle head.

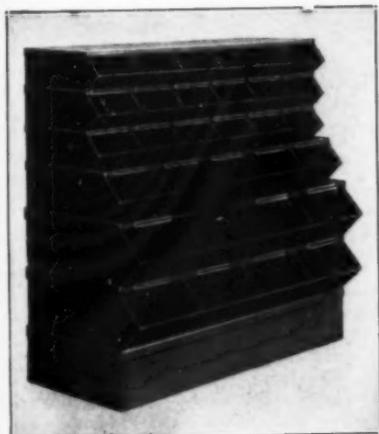
Model 33 is a special high speed precision unit, affording three speeds—1800, 3600 and 6000 r.p.m., with 6" Resinoid bond grinding wheel, arbor and aluminum wheel guard.

Beg Your Pardon

An extra cypher may not mean much to a linotype man—and it sometimes gets by the proofreader. But it may make a lot of difference in the shop.

In Mr. Staub's excellent article on Gear Hobbing in the February issue, on page 28 near the middle of the second paragraph in the right hand column, it should have been stated that "Runout should be within .0002". In about the same place on page 30, this should have read that "errors may be within .0002". Our sincere apologies to readers and to Mr. Staub.

PARTS STORAGE— WHERE YOU NEED IT.



Especially useful where parts or materials must be kept accessible *at the job*, Stackbin sections stack together to form permanent or temporary stockrooms. Sturdy steel sections can be set up quickly—moved, dismantled or added to easily—any place they're needed.

In the stockroom, patented Stackbins are the perfect solution to the problem of keeping a wide variety of parts within instant reach.

See for yourself how Stackbin sections speed up storage and handling—how they can save you real money. Write Stackbin Corp., 55 Troy St., Providence, R. I., for full details and low prices.

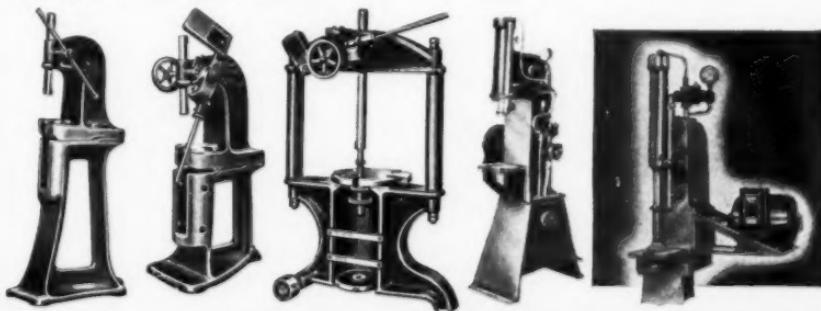
STACKBINS

"STACKED AND STILL ACCESSIBLE"

BROACH and ASSEMBLE

65

standard styles and sizes—manually operated presses from $\frac{1}{4}$ to 35 tons pressure—motor driven hydraulic presses from $1\frac{1}{2}$ to 15 tons pressure. Write for catalog F.



GREENERD ARBOR PRESSES

NASHUA

Est. 1883

NEW HAMPSHIRE



FOR Surer TRACTION

In heavy going you can depend on diamond treads to keep the load moving. For a surer grip on screw machine stock you can depend on Sutton DIAMOND-GRIP Collets to grip tighter under less tension. Their clean-cut diamond-shaped serrations attack horizontal and rotating thrusts at an angle. You can measure the advantage of their surer gripping power by spoilage reduction.

Sutton DIAMOND-GRIP Collets



Ask for
complete
Sutton
Catalog

SUTTON TOOL COMPANY
2895 W. GRAND BLVD. DETROIT, MICH.

Accessories for Screw Machines

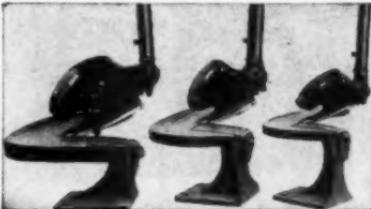
New England Research and Engineering Directory

A new directory of research and engineering facilities in New England is intended as a guide book for the manager or executive in search of advice or assistance. It gives in comprehensive detail, the facilities, experience and industries served by over 300 private consultants, as well as the colleges and universities in the territory having laboratory and research facilities. There is an index by types of services rendered, by which the industrialist may discover the consultant able to serve him in any one of 1300 different services.

A brief foreword gives expert advice on choosing the right supplementary service from outside the organization.

The directory was compiled by the Committee on Industrial Cooperation of the Engineering Societies of New England, Inc., 715 Tremont Temple Bldg., Boston, Mass. This is a non-profit publication and single copies of the directory are priced at \$2.00 each.

HEAVY DUTY BENCH SHEARS



Model 3

Three sizes of BEVERLY SHEARS offer you modern shearing performance.

Model B-1 weighs 16½ lbs.—cuts stock up to 14 gauge.

B-2 weighs 32 lbs.—handles up to 10 gauge.

B-3 weighs 55 lbs.—takes up to 3/16" mild or 10 gauge stainless steel.

Reasonably priced—send for descriptive circular

THE BEVERLY SHEAR CO.
3007 W. 110TH PLACE, CHICAGO, ILL.

Electrical Couplings

The Diesel engines of the new "Mor-mac-penn" have no mechanical connections between them and the gears that turn the propeller.

Power is transmitted from the engines to the gears through a new form of electric coupling built by Westinghouse. These couplings provide an electric cushion as the power is transmitted electrically across the air gaps of the couplings. They prevent the pulsations of engine torque from reaching the gears—and also act as disconnecting clutches by which the engine can be connected or disconnected from the propeller instantly.

Operation of the coupling is quite simple. It consists of two rotating members, revolving together, one inside the other. One is mounted rigidly on the engine shaft. The other is connected to the gear. The external member has salient field poles, connected to the ship's d. c. auxiliary power for excitation. Rotating inside this field is the inner member with a squirrel cage winding. Mechanical rotation of the field member creates a rotating magnetic field which induces currents in the squirrel cage. Interaction of the resulting magnetic fields creates

powerful forces which cause the squirrel cage to follow the field, except for a small slip, just as the secondary of a squirrel cage induction motor follows the rotating magnetic field set up by the stator.

Their use as disconnecting clutches is especially useful in multi-engine ships. Near a dock, the ship can be maneuvered in either direction by operating a single lever which applies field to the proper couplings, connecting the propeller to the ahead or astern engines as required.

LYON Hydraulic TRUCKS

LIFT TRUCKS

for Handling



SKIDS

or

PALLETS

(Single or Double Faced)



TRUCKS

with

Hydraulic

ELEVATING TABLES

for

HANDLING SHEETS

Also *Hydraulic Die Handling Trucks*,
Hydraulic High Lift Trucks, Skid Platforms, and Factory Floor Trucks.

LYON IRON WORKS

MATERIAL HANDLING EQUIPMENT

103 MADISON ST.

GREENE, N.Y.

"Phonopoint" Diamond Scriber

This scribe contains a diamond sharpened to a highly polished 80° included angle on the point.

It is mounted in a small chucking device, similar to the standard Starrett scribe holder, so that when not in use, the diamond can be reversed in the handle eliminating chance of breakage.



The tool is particularly adaptable to

scribing on hardened steels or as a substitute for an etching tool for writing on hardened steel, tungsten carbide, or glass. It is also extremely useful when applied as a wheel dresser on small mounted Abrasive points. The development of new automatic lapping equipment is said to make this tool inexpensive to the point where it is indispensable to every tool maker's kit.

Address Abrasive Dressing Tool Co., 1550 Broadway, Detroit, Mich.

Precision Collet Chuck

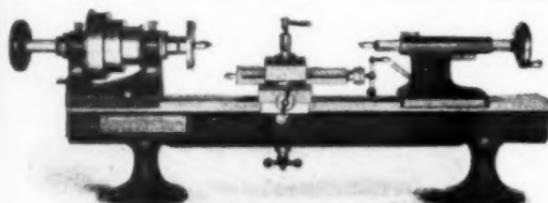
THE Erickson Precision Chuck has the only collet capable of collapsing 1/32" and still maintaining accuracy.



Pat. Pending
Collet is open-slotted at BOTH ends. The consequent high collapsibility permits each of the 8 contacting points to grip equally true on the differing shank diameters.

Chuck Shank can be made to fit any type spindle, Male or Female.

ERICKSON STEEL CO.
East 80th & Bessemer,
Cleveland,
Ohio

**WADE**
Bench Lathes

Economical, accurate, enduring for turning, drilling, threading, grinding, milling and screw machine operations.

Wade Tool Co.
Waltham, Mass.

Corox Immersion Heaters

A new Corox immersion heater for oil tempering baths is announced by Westinghouse.

The unit is rugged in construction and scientific in design. Made of high quality steel tubing, these heaters have a low watt density of approximately 11 watts per square inch of active tube surface.

They are available with an effective heating depth of either 5" or 10". The 5" units have a rating of 2000 watts at 115 or 230 volts, and the 10" units have a rating of 4000 watts at 115 or 230 volts. Any of these models may be connected in series on 440 volts.

Additional information may be obtained from the Heater Division, Westinghouse Electric & Mfg. Co., Mansfield, Ohio.

ANDERSON Improved Balancing Ways



Every shop handling rotating parts needs this simple, sturdy, dependable device for balancing, straightening and truing operations. Saves time and trouble and assures better work.

Four chilled iron discs rotate with minimum friction on sensitive special bearings, giving a prompt, sure indication of whether or not the work is in perfect balance.

Write NOW for full information.

Swing	Greatest Distance Between Standards	Capacity in lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000

**ANDERSON BROS. MFG. CO., ROCKFORD, III.
1907 Kishwaukee St.**

Pullmore Clutches

Provide Powerful Positive Control

In the grueling service of industrial trucking, Pullmore Clutches provide a dependable and economical control of power transmission for rapid pick-up, heavy loads and frequent operation. Pullmore Multiple-Disc Clutches are simple, compact, easy to install; are available in single or double types, for operation in oil or dry, in capacities from 1 h.p. to 75 h.p. at 500 r.p.m. Write for the Pullmore Blue Book showing applications, features and data.



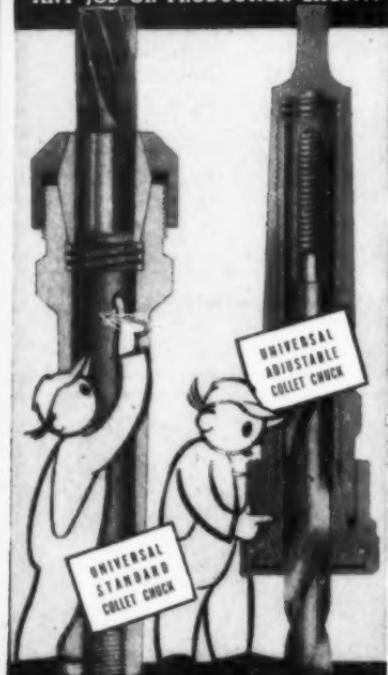
Also available are Rockford Spring-Loaded Clutches and Rockford Over-Center Clutches for a wide variety of industrial uses. Investigate.

Rockford Drilling Machine Division

Borg-Warner Corporation, 410 Catherine Street, Rockford, Illinois
Sold by MORSE CHAIN CO., Ithaca, N.Y. Offices in Principal Cities

TWO GREAT COLLET CHUCKS

THAT DO AN OUTSTANDING JOB IN ANY JOB OR PRODUCTION SHOP...



All Universal Collet Chucks have ground threads and handy wrench grip on shanks. Adjustable chucks, designed for single purpose drilling, adjust within .002". Standard chucks are ideal for holding end mills, keyway cutters and drills. Write for complete facts.

UNIVERSAL
Engineering Company
Frankenmuth, Mich.

Dumore Mounted Wheel Shank Support

A mounted wheel shank support for internal grinding of small holes to considerable depths has been developed by the Dumore Co., Racine, Wis. A special 3" wheel shank is necessary for use with the support.

Weak wheel shanks and small wheels formerly would not permit operation at high speeds with a shank 3" long. Small diameter holes had to be "eased" out or not ground at all.



However, with the Dumore wheel shank support, it is asserted that shopmen can grind small diameter internal jobs quickly and efficiently. The tapered support slips over the wheel shank, minimizing possibility of "whip." Whipping is often caused by weak shanks bending under pressure of the wheel on the work and the support sufficiently reinforces the shank to permit deeper cuts.

On one particular job—a hole $2\frac{1}{2}$ " deep and $\frac{1}{4}$ " in diameter—was ground in 15 minutes, a fraction of the time formerly required for the same work.

The shank is $2\frac{11}{16}$ " long and .2204" in diameter at its larger end. There is a $\frac{3}{8}$ " per foot taper to the shank.

New England Stages Show

The State Armory, 1494 Main St., Bridgeport, Conn., will house what promises to be one of the largest tool and equipment exhibits ever held in New England. The Show will run on March 6, 7, 8 and 9 and the sponsors are the Bridgeport Tool Engineer's Ass'n.

The Association membership includes approximately 100 tool engineers associated with industrial concerns with-

in a radius of 25 miles of Bridgeport. Headquarters will be at the Stratfield Hotel, with representatives at Hotel Barnum.

Two technical sessions are scheduled. The first will be under the chairmanship of E. P. Gillane, while the second will have B. Merwin as chairman.

Already more than 125 manufacturers have contracted for space. The lines to be exhibited assure a diversified and well rounded representation of modern production facilities.

ANNOUNCING

New

HORN MODEL

ROUSSELLE PUNCH PRESS

Your need for a modern, speedy, safe and efficient punch press is met in this NEW Rousselle Punch Press.

This press is a money-saver, a time-saver, gives you absolute assurance of safety; and, is built, primarily, for the small job. The points of this NEW machine can be summed up in one phrase, "small but mighty". Consider just two of the several outstanding features. A Safety Automatic Knockout Bar—A Non-Repeating Clutch.

Your letter, requesting our illustrated circular and complete information on the new Horn Model, Rousselle Model No 1 and Rousselle Model No. 0, will be promptly answered.

DAVID J. ROSS CO.
BENTON HARBOR, MICHIGAN

CHUCK TROUBLE?

Three typical cases where NEU-T-ROL solved annoying expensive production problems:

No. 1—A manufacturer had been grinding lathe beds to "tenths" and then distorting the beds several thousandths in hauling them free from the surface grinder's magnetic chuck with a power hoist.

He found that NEU-T-ROL released the lathe beds promptly and fully every time from the magnetic chuck.

No. 2—A leading manufacturer of refrigerators had to lap many compressor valve discs marred in prying loose from magnetic chucks.

They found that NEU-T-ROL completely eliminated this extra lapping operation—promptly freeing and demagnetizing the discs.

No. 3—A maker of shearing knives had been forced to hammer the knives free from his magnetic chucks with a babbitt hammer. This meant occasional chipping or breakage of knives.

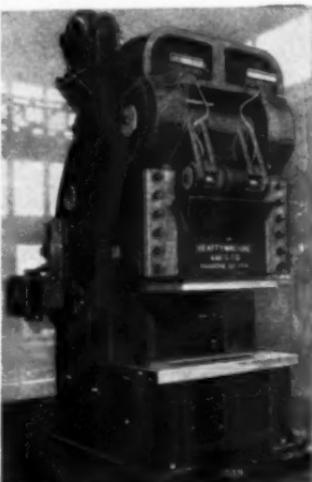
NEU-T-ROL solved this problem by doing away with all need for hammering. The loss of a single knife breakage would have paid for the NEU-T-ROL equipment.

NEU-T-ROL saves time and trouble with small magnetic chucks. It is ESSENTIAL with big chucks. If you use Magnetic Chucks, you need NEU-T-ROL. Leading manufacturers can now supply NEU-T-ROL built-in on your new equipment—if you specify it! Write TODAY for full information.

Electro-Matic Products Co.
4036 N. Kolmar Ave.,
CHICAGO, ILLINOIS

Beatty Toggle Punch Presses

The "16" series of toggle presses offer compactness with high punching capacity. Die space is large. These units are suitable for punching and shearing tie plates, punching and straightening splice bars, and for general manufacturing purposes, punching and shearing. Drive is mounted inside frame.



A toggle press can be supplied with hydraulic head which applies approximately 60 tons pressure on bar while punching, giving straight forgings and eliminating re-handling.

A toggle punch can also be supplied with hydro - pneumatic accumulator which supplies hydraulic pressure to the die head. It can be equipped with magnetic or air clutch with convenient control station.

Series 16 has a capacity rating of 700 tons. Model 16-A is rated at 850 tons and 16-B, 1000 tons.

Flywheel shafts are roller bearing equipped. Slide is air counterbalanced. The makers emphasize that the use of the toggle to operate the slide reduces the size and number of gears as well as the motor h.p.

Folder 1500-A gives complete details. For a copy, address Beatty Machine & Mfg. Co., 954 150th St., Hammond, Ind.



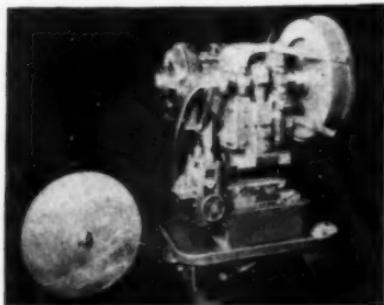
the cutters. The block at left shows sample Cherrying cuts easily performed with the attachment.

The driving gears are of the same distinctive curved tooth shape—(in reality a curved herringbone). As end thrust is equalized with this design, no thrust bearings are required.

Woodruff key cutters with teeth of this same design are also offered, made in any size required. The teeth are said to give a rapid shear cut and stand up well in hard service.

Power Embossing Machine

The Bates machine shown was designed for embossing aluminum number tags for attachment to Navy parachutes. It should interest any manufacturer who desires to produce quantities of numbered tags or nameplates.



The press is a light, powerful unit operating at about 125 strokes per minute. Above the ram is a counter for tabulating the number of tags produced at a setting.

Aluminum tape, .016" thick x $\frac{1}{2}$ " unwinds through the roll feed. The die set contains embossing type, upper and lower mating characters, followed by a hole punch and cutoff.

The outfits are furnished with a complete set of interchangeable embossing type, but if desired, an automatic embossing head can be substituted for the consecutive numbering.

Address H. O. Bates, 251 North Broad St., Elizabeth, N. J., for full details.

Machine Tool Drives

By Berkeley

for
Any
Machine—
Any Type
Any Size



Welded steel supporting brackets with aligning screws.

Rigidity of countershaft support that permits no distortion or mis-alignment.

Simple, quick adjustments for all belts which will insure long uninterrupted periods of service.

We are ready to solve
your Drive Problems.
Send for details.

The BERKELEY EQUIPMENT CO.
CORRY, PENNSYLVANIA



Why Not Buy The Original Electric Etcher?

MARK IRON AND STEEL THE ETCHOGRAPH WAY

New ELKONITE TIP pencil.
New Baby Grand Model at a
lower price.

**2,000
in use**

WILLIAM BREWSTER & CO., INC.
42 Church St., New York, N. Y.

Better
GRIP
Prevents
SLIP—



KNURLED SOCKET SCREWS

Speed Up Production!

It's the knurled BETTER GRIPPING HEAD—found only on "Unbrako" products—that provide a non-slip surface for the mechanic's fingers or pliers. This means

time saved on production jobs . . . and time saved is money in your pockets.

No other screw has all the advantages of Knurled "Unbrako"—write for our catalog for details.



FIG. 1434
Knurled
Socket Head
Cap Screw



FIG. 1446
Knurled
Socket Head
Stripper Bolt

STANDARD PRESSED STEEL CO. JENKINTOWN, PENNA.

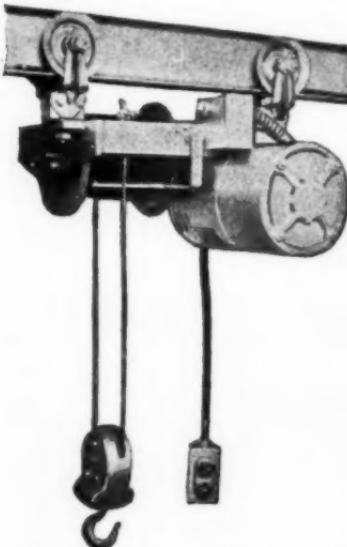
Boston
Detroit
Indianapolis

Box 559

Chicago
St. Louis
San Francisco

Electro Lift Aluminum Hoist

Electro Lift, Inc., 30 Church St., New York, N. Y., announces a new, light weight, high speed, cable type electric hoist with all castings of aluminum alloy.



The light weight makes it especially suitable for applications requiring frequent moving and handling. It is also suitable for use in steam and acid fumes on account of the non-corrosive properties of the aluminum alloy.

Built in sizes from $\frac{1}{8}$ to 3-ton, it has all the speeds and ratings of standard Electro Lift hoists. It may be equipped with traveling rope guide to eliminate the hazard of crossed or piled up cables where loads are pulled at an angle from the vertical.

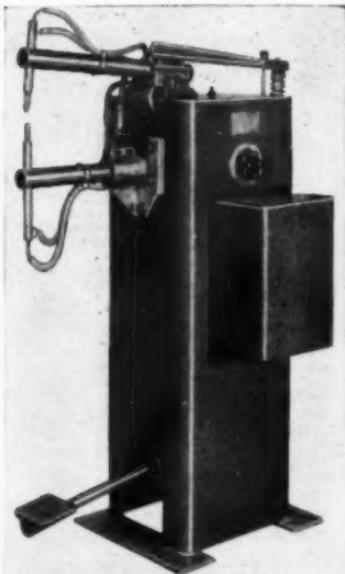
Worm drive is used with worm and wheel running on Timken tapered roller bearings, fully enclosed within the gear case and running in a bath of oil. The motor has ball bearings and is directly attached to the hoist frame. The hoist has close headroom allowing the

hook to reach within a minimum distance of the overhead track.

Control may be either by rope or push button. Top and bottom limit switches may also be provided to stop the load in either direction of travel, preventing running the cable off the drum and providing accurate stop at bottom or top.

A Light Duty Acro Welder

Foot operated, light duty welders in sizes ranging from 5 to 20 KVA., are included in the complete line of welding equipment offered by Acro Welder Mfg. Co., 1570 So. First St., Milwaukee, Wis.



Frames are of sturdy arc welded steel construction, with throat capacities up to 24".

Lower horn sockets can be furnished for raising or lowering and movable from side to side.

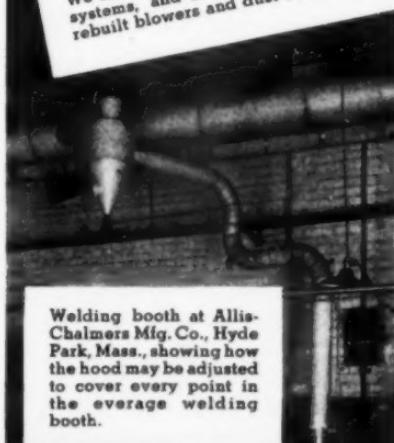
The foot control is also movable from side to side.

The transformers are said to be built to stand continuous high speed service,

Safeguard YOUR WORKMEN

Keep workrooms and factories free from dust and fumes. The Berg Fume and Dust Collecting Unit is extremely flexible, and is quickly and easily moved to cover every spot within a circular space of 12 feet in diameter. The Berg Unit is constructed entirely of metal. Low in first cost and up-keep, and easily installed. Approved by State Department of Labor and Industries. Write for further details.

We install all kinds of dust collecting systems, and carry in stock new and rebuilt blowers and dust collectors.



Welding booth at Allis-Chalmers Mfg. Co., Hyde Park, Mass., showing how the hood may be adjusted to cover every point in the average welding booth.



C. F. BERG & CO.

72-74 E. Dedham St. - Boston, Mass.

and the standard models are provided with eight temperature changes.

All machines are equipped with high speed contactors. Timers can be supplied at a slight additional cost.

Electrodes are interchangeable No. 1 M. T. and water cooled.

1940 Machine Tool Electrification Forum

The 1940 Machine Tool Electrification Forum will be held at the East Pittsburgh, Pa., Works of the West-

inghouse Electric & Mfg. Co., May 6-8, instead of April 29-May 1 as previously announced.

This change in date has been made so that the Forum will not conflict with meetings of two industrial associations which had scheduled sessions at about the same time.

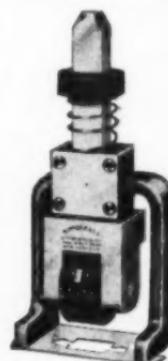
Numberall Stamp Holder

A new model 49 stamp holder has been developed by Numberall Stamp & Tool Co., Inc., Huguenot Park, Staten Island, N. Y.

It is intended for use with multi-wheel numbering machines 70 and 80, and with the No. 5 automatic numbering head.

The device has been designed to hold the stamp square with the work. The stamp is depressed until it touches the work, and a hammer is used to make the impression.

The bottom gauge facilitates placing the stamp so the mark will come just where it is wanted. Large plates and panels can be stamped. The stamp can also be removed from the holder when desired. Stamps can also be furnished with a knob for hand stamping small size numbers and up to five wheels.



New Tag and Label Addresser

\$4.98

Complete



Simply typewrite or handwrite on stencil-printing capacity 9 lines. For 2 cents you can address thousands of tags or labels or print direct on packages and boxes.

Sent anywhere on 10 days free trial.

Weber Addressing Machine Co.
337 So. Dearborn St., Chicago, Illinois



ROGERS Type E Combined Knife Grinder and Saw Sharpener

Supplied with belt drive or built-in ball bearing motor. Can be furnished with or without saw gummimg attachment for circular saws up to 22" in diameter. The lowest priced, high grade combination grinder on the market. 3 sizes: 26", 32" and 38". Write for details.

We make a full line of knife grinders and saw sharpeners.

SAMUEL C. ROGERS & CO.
203 DUTTON AVE., BUFFALO, N. Y.

Cincinnati Hydraulic Universal

A new universal grinding machine by Cincinnati Grinders Inc., includes many unique features.

The machine has a swing of 12" and can be obtained in between - center lengths of 24", 36", 48" and 72".

Wheel head incorporates the recently announced Filmatic spindle bearings. They are of multiple shoe construction, steel backed, bronze lined, and self-adjusting for variations in load resulting from heavy or light cuts. A safety switch prevents operation without an adequate supply of oil.

The grinding wheel on one end of spindle and driving sheave on other



end are mounted close to the bearings reducing bending moment from the load applied. A 3 h. p. motor, on top



THE LATEST TOTALLY ENCLOSED DUST-COLLECTING FINISHER

ARMGLO "SPEEDSTER" ABRASIVE BAND FINISHER

makes sanding . . . surfacing . . . polishing and burring of castings . . . dies . . . stampings . . . die castings . . . moulded products and machine parts an easy and quick operation. It eliminates slow, costly hand labor. In addition to fast production you get finished work that is flawless. Pays for itself many times over in time and labor saved. Send TODAY for descriptive bulletin.

ARMGLO COMPANY
3520 W. PIERCE ST. **MILWAUKEE, WISCONSIN**

-GEARS-

Spur—Helical—Worm— Bevel—Miter, Etc.

We do broaching and all kinds of grinding.

We specialize in grinding hardened steel bushings, cam rollers, etc.

Prompt service and quality has retained a large list of customers for 25 years.

TAYLOR MACHINE CO.

1919 E. 61st St., Cleveland, Ohio

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

*Write for
bulletins.*

ZEH & HAHNEMANN CO.
Newark,
New Jersey

of wheel head unit, drives the grinding wheel spindle. Wheel mounts are of the balancing type.

Table feed is actuated hydraulically from a circuit which supplies pressure on both sides of the piston. Feed rates are infinitely variable from 3" to 240" a minute. At each end of the stroke, table tarry may be independently adjusted from 0 to 5 seconds, while accuracy of reversal at any table speed is within .004". Stroke of the power table traverse with automatic reversal may be set as short as 3/32". This short stroke produces an effect comparable to a grinding wheel spindle reciprocating attachment.

A new mechanical speed change device, built into headstock, eliminates need of a variable speed d. c. motor. An infinite number of work speeds may be obtained, from 55 to 500 r.p.m., by merely rotating a small handwheel in front of the unit. Headstock may be swiveled at right angles to grinding safety switch prevents operation with the necessary mechanism for quick changes from live to dead spindle operation.

Automatic control of the work rotation and coolant flow is included as a standard feature.

A hinged type internal grinding attachment is included as standard equipment.

Table has two hand controlled traverse rates—a fast movement of 15/16" per revolution of the handwheel for setting up and long adjustments, and a slow movement of .050" per revolution of the handwheel for fine adjustments and for shoulder grinding. Mechanical hand traverse is supplied as standard equipment but, if desired, hand hydraulic table control may be substituted easily.

The hand infeed traverse of the wheel head also has two speeds. In high gear the unit moves at a rate of $\frac{1}{4}$ per revolution of handwheel, while in slow gear it moves at a rate of .050". For accurate sizing, the device may be adjusted in increments of .0001" reduction of work diameter. Incidentally, automatic infeed at table reversal may be adjusted from .0004" to .014".

Buyers' Service Directory

LET US QUOTE...



Our new modern plant is fully equipped with special machinery for

**COMMERCIAL JIG BORING,
DESIGNING AND BUILDING
of
DIES, JIGS AND FIXTURES
LARGE OR SMALL**

We can handle your Jig Boring jobs at reasonable prices on our new 18"x36" Pratt & Whitney Jig Borer. Quick service.

Have been delivering satisfaction since 1929—let us serve you.

QUALITY TOOL & DIE CO.

Ray W. Rice, Manager,
481 N. Noble St., Indianapolis, Ind.

**World's Lowest Cost
STAMPINGS**
in small or large lots

Special: Total die and stamping cost for 1000 flat blanks most any shape up to 10 sq. in. **\$25.00.**

We can save you money on all types of sheet metal parts in small quantities.

All types of dies designed and built.

SOUTHERN PRODUCTS
Dept. H10 INDEPENDENCE, MISSOURI

**GRIND THE
EASTERN CENTERLESS WAY**
ACCURACY-FINE FINISHES-LOW COST
Large or Small Lots

EASTERN CENTERLESS GRINDING CO.
624 Capitol Ave., Hartford, Conn.

CENTERLESS GRINDING

Straight—Tapered—Double Diameter
Shoulder and Profile Diameter
Internal Grinding—External Grinding
Taper and Straight Dowel Pins Made to Order
Screw Machine Products Heat-Treated
Before Grinding If Necessary

Industrial Centerless Grinding Co.
14644 Schaefer Road Detroit, Mich.

Centerless Grinding
(CONTRACT WORK)

**PRECISION, FINE FINISH,
LOW COST**

May we quote on your specifications?

THE HEIM COMPANY
Fairfield, Connecticut

KENNAMETAL POINTS OF SUPERIORITY

1**HARDER.**

KENNAMETAL is harder than the hardest tool steel . . . requires less "down time" for grinding tools . . . cuts at much higher speeds.

KENNAMETAL
Chip Breaker Tool**2****STRONGER.**

KENNAMETAL is stronger than other tool carbides of the same hardness range . . . takes interrupted (jump) cuts without breakage.

3**"CRATER" RESISTANT.**

KENNAMETAL is highly resistant to the cratering action of steel chips . . . assuring reliable performance over a long period of tool life.

Set New Records in Your Plant

No other metal cutting material possesses ALL of these advantages. Write today for complete information about KENNAMETAL.

MCKENNA METALS Co.135 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

CHATTERLESS COUNTERSINKS



Severance countersinks are designed to take heavy cuts and at the same time produce an amazingly smooth seat. The cutting teeth are so

arranged as to give a shearing cut and make chatter almost impossible. Special countersinks made in various combinations of angles, diameters, lengths, ball nose, double angle, and shank types and sizes.

Submit your problems with full particulars to our engineers or write for Bulletin No. 12-B.

Severance Tool Manufacturing Co.
1510 East Genesee Ave. Saginaw, Mich.

Tag and Label Addresser

Where tags or labels must be addressed in quantities, the Tag-O-Graph, Jr., will save time, money and errors. For a few cents, the makers assert that



thousands of tags or labels can be addressed, or it is possible to print directly on packages or boxes. Printing can be done on paper, wood, cloth, leather, etc. Printing capacity is nine lines. Stencils may be handwritten or typewritten.

Each Tag-O-Graph comes complete with a can of waterproof ink and 25 stencils.

Write Weber Addressing Machine Co., 537 So. Dearborn St., Chicago, Ill., for details of their trial offer.

Challenge Expands Line

The Challenge Machinery Co., Grand Haven, Mich., announces a line of accurate surface plate equipment designed for use in inspection, layout, assembly and other surface plate operations, as well as bench work.

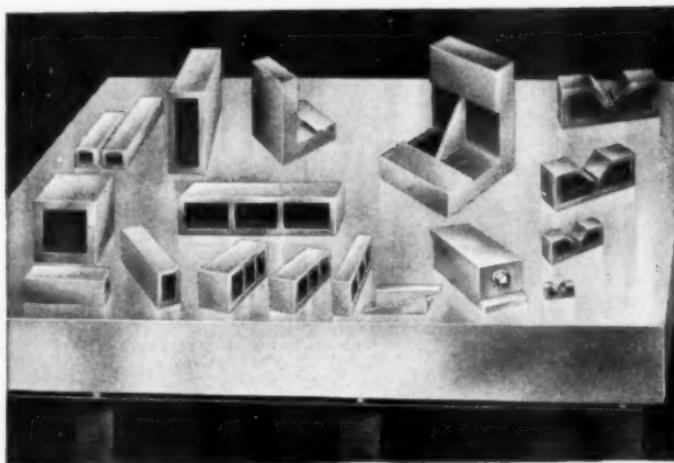
Challenge surface plate equipment consists of ribbed and box parallels in several sizes, V-blocks up to 6"x8"x8".

CARROLL Universal Dividing Heads

22 Years of Popularity. 6°, 10½°,
12° Swing. Right or Left Hand
Type.



WM. CARROLL & SON
1776 Lexington Ave., (Norwood) Cincinnati, Ohio



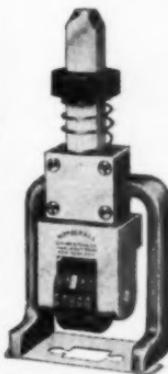
adjustable leveling blocks to compensate for odd dimensions, and a wide range of angle plates for holding or clamping the work.

Each unit, the announcement states, is made from the highest grade fine-grained iron, machined smooth, square and accurate. The manufacturer further states that all Challenge surface plate equipment is furnace normalized, assuring permanent accuracy, and that it is moderate in price.

The addition of surface plate equipment rounds out the Challenge line of time and labor-saving devices for the machine and tool industries, as Challenge surface plates, bench plates,

benches, cast iron bench tops, elevating trucks, and abrasive cut-off machines are already well known to the trade.

Mark it Quickly with a Numberall



**Numbering Machine
For Stamping in
Metal, etc. Made in
Hand operated or
Automatic Models.**

**With Hand or Press
Shank. New Stamp
Holder No. 49
holds Stamp
straight for perfect
impressions.**

**A hammer is used to
make the impression.**

Write for Details

**Numberall
Stamp & Tool Co.
Huguenot Park
Staten Island, N. Y.**

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

**Write for Circular
NIELSEN TOOL &
DIE COMPANY
1859 Gardner Ave.
Berkley, Mich.**

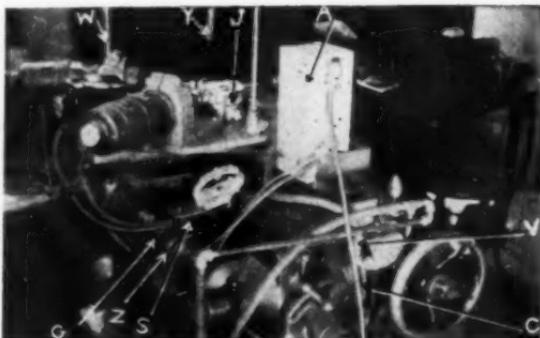
Shop Notes

Using Available Equipment

Having a fairly large production on cast aluminum pieces, but not enough to warrant the expenditure necessary to purchase special equipment for this work, we commenced looking around our own plant for such equipment (obsolete or otherwise) as would enable us to produce the required number of these castings at a reasonable cost.

The profiling operation was easy as we had available a Pratt and Whitney profiler for profiling surfaces indicated by P (Fig. 2).

As the drilling of these pieces required both horizontal and vertical spindles, we decided to separate the drilling into two operations. For the



Govro - Nelson drilling unit on the table of this press in proper position to drill one of these holes. With this set up we were able to drill a total of 10 holes—nine in a vertical position and one in horizontal.

This still left four holes to be drilled in the horizontal position - two at 25° angle from the center line.

In looking over some equipment which had been replaced with more modern tools, we found a No. 0 Brown and Sharpe automatic screw machine. This we dismantled by removing the spindle, turret and slide, and in fact practically all parts except the back shaft and cam shaft.

On the turret slide, we mounted a stationary fixture to take two Govro-Nelson drilling units set on a 25° angle, either side of the center line, to drill the two holes at these angles. As these units are self feeding, we merely mounted them in the proper position for drilling the holes, with an electric limit switch mounted at S (Fig. 1), operated



first, we used a multiple spindle Fox press for all holes drilled from the vertical. Because of the close center distance between two of the horizontal holes, which prevented drilling them in the same set up, we mounted a

by a cam mounted in the proper position on the dog carrier Z which is standard equipment on the screw machine. On front and back cross slides of the screw machine, we mounted small ball bearing motors, on the shafts of which we attached small drill chucks for holding the bearing hole drills. These holes must be in alignment. A facing tool is placed on one of these drills, for spot facing the bearing hole after drilling. These drills, being mounted on the front and rear cross slides, are fed to their work by suitable screw machine cams.

The drill jig, J, holding the casting to be drilled, is mounted in the center of the fixture supporting the Govro-Nelson drilling units and, of course, is stationary. The casting is held in this jig by two air operated clamping levers. Air being admitted between two pistons in the base of the drill jig forces these pistons outward against the lower end of the clamping levers, causing them to grip the work securely. Air is admitted to the cylinders by means of an air valve, V, timed and actuated by the cam, C, on the cam shaft which would regularly take the lead cam on the screw machine.

Air hose Y is used to blow the chips from the fixture after each piece is drilled and is operated through an air valve which in turn is opened by a dog mounted on the regular dog carrier G.

With a motor, mounted to drive the back shaft of the screw machine, this special drilling fixture becomes automatic. All that is necessary is for the operator to place a casting in the fixture and remove it at the end of the cycle. By using the proper change gears, the cam shaft can be run at a speed which gives the necessary time for drilling the casting, loading and unloading the fixture.

An extension on starting and stopping lever, W, puts the control of the machine in easy reach of the operator at all times. A is the main switch and controls all motors used on the machine.

By Albert L. Emens, A. S. M. E.
Sup't. Duncan Electric Mfg. Co.

Cleaning Small Recesses

A pointed wooden stick is handy for cleaning gummed dirt from typewriter keys, dies and other similar small machine parts that would be scratched or marred by any metal point. Wood which is too soft however does not keep a satisfactory point for any length of time and is hard to draw to a point with the usual desk or pocket knife.

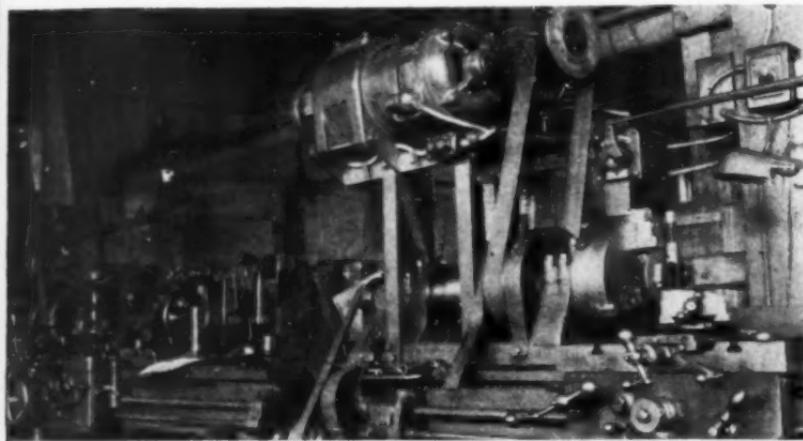


A number of ordinary round carmel apple or lollipop sticks serve the purpose well. The wood has some toughness of grain to stand rapid machining in manufacture. Run both ends of the sticks into a pencil sharpener which will bring them to a neat tapered working point. They will be found very easy to work with, not too hard and not too soft, and readily procured from any confection store or shop. Some four or five around the plant bench or desk will last a long time for this purpose. When a bit dulled or blunt, one or two turns of the pencil sharpener will bring them to a neat working point again.

Frank Bentley, Clinton, Ia.

Push Button Speed Control

The illustration shows an engine lathe in the plant of the Reeves Pulley Co., Columbus, Ind. It has been equipped with a motorized variable control speed transmission unit and electric remote control in place of the conventional



handwheel (manual) speed adjustment. This eliminates need of the step cones shown, and is desirable because this lathe is used to handle a wide range of work calling for easy speed variability.

If the usual manual handwheel speed control were used, the operator would have to step around the end of his lathe, from his normal operating position, to adjust the speed. With the electrical remote control, the operator merely has to press a "Fast" or "Slow" button, shown on the bracket just below the motorized unit, without moving from his normal position in front of his work. The speed range is 6:1.

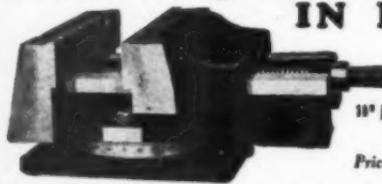
Francis A. Westbrook, M. E.

Handy Can Opener

Small vacuum or compression lids and covers are of course readily lifted out and up with the point of a screwdriver or similar pointed tool. Larger covers of this kind are used on cans containing many of the materials used about the shop and job. Such lids, have a much greater holding area and do not come up so readily. They are often damaged by the use of a small lifting tool.

Procure a common small toy magnet and grind it on the emery wheel as shown, making a neat and efficient lifting edge of the two ends or poles. They are ground out in the center to an arc of a large circle which conforms

SUPERIOR QUALITY AND WORKMANSHIP IN PLUNKET VISES



SQUARE BASE SHAPER VISE

The Shaper Vise has graduated base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center to center of slots.

18" jaws, 2 1/4" deep, opens 8 1/2". Weight 125 lbs. \$46.80
Our complete line includes: Vises for Drill Presses,

Milling Machines, Shapers and Grinders.

Prices are net, f. o. b. Chicago. Write for illustrated folder today. Dealers wanted in unoccupied territory.

J. E. Plunket Machine Co. 1823 W. Lake Street
Chicago, Illinois

to the curvature of the covers or lids. In this manner, more of the cover is contacted at the same time and will not become bent or distorted in the lifting.



When the lid is up a trifle all around, turn the tool over and it will be found easy to pry off the lid.

Frank Bentley, Clinton, Ia.

The Milling Cutter

Here's a how "not to do it" yarn, based on an experience in Buenos Aires in 1926.

A tractor axle had badly worn splines. Replacement was not available so it was built-up by welding. An unsuccessful attempt was made to cut the splines by hand.

The job of making a milling cutter was entrusted to a Turk named Rodolfo. Lathe, milling machine and drill press made up the entire machine tool resources.

A piece of 3% nickel steel (containing neither chromium nor vanadium) was soon converted into a good looking cutter. Teeth were cut with a dividing

head in the usual way, and final sharpening was to be done later.

Hardening facilities consisted of a blacksmith's forge, coal and a hand blower. The blacksmith was a Spaniard and a good one. He said bluntly that as Rodolfo was making the cutter, he had better harden it, which that worthy attempted to do by heating it to a bright red and dropping the cutter in oil.

With considerable assurance, Rodolfo mounted the cutter in the milling machine and started work.

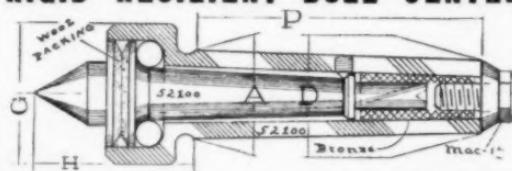
For two good reasons it did not cut. The hardening treatment had failed to harden—and the cutter was running backwards.

Touching the cutter up with a file, Rodolfo heated it again and bopped it into the oil. Still the same result. The third time it was heated until white hot and still no luck. White hot again and into water. By this time the cutter was burnt or oxidized, so it was useless anyway.

Then some of the rest of us were asked about the job. A standard cutter was found in stock. It was about wide enough to do so a tin template was made from the hub, into which the shaft fitted so as to get the right angle. The standard cutter was mounted on an arbor in the lathe and run backwards against an oil stone held firmly in the hand. It required but little time to get an angle on each side that was approximately correct, and the cutter was backed off with the same stone by hand, for clearance. Setting the cutter up in the proper way, the job was done in short order.

Gordon Rosekilly, San Mateo, Cal.

RIGID RESILIENT BULL CENTER



Rigid Tool Holder Co., 2,000 Witherell St., Detroit, Michigan

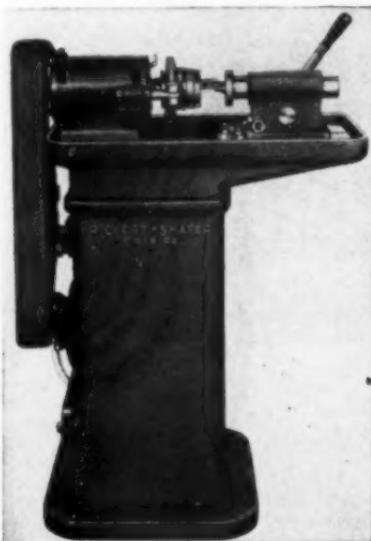
A disappointed buyer is slow in paying for his disappointment; while we have never yet lost a dollar, on a purchase order; or a customer that we know of; and seldom send out a "Please remit". But we are real cranky, about good work, and good material. The best is none too good. Excellence in Designing and Manufacturing is Excellence in Advertising.

All Morse tapers carried in stock.

Motor Driven Threading Machine

A new horizontal hand threading and tapping machine of compact design is announced by Rickert-Shafer Co., Erie, Pa. for use wherever "second operation" threading and tapping jobs are handled up to $\frac{1}{2}$. The popular R. & S. Model C self-opening die head mounted on the ball bearing spindle is automatically closed on the backward movement of the operating lever. The Model "C"

collapsible tap can be applied easily for tapping, resetting, is accomplished with the same backward movement of the operating lever.



V Jaws 6°, 9° and 12° Long
For DRILL PRESS. Often used

on Miller,
Shaper,
Planer.



DRILL SPEEDER

or

H. S. Drilling Attachment

For use in Drillers from 20-in. to largest Radial. Suits Straight or T. S. Drills up to $\frac{1}{4}$ " with Speeds to 3,000 Rev. Increases Speed 3 times.

Send for Circulars

THE GRAHAM MFG. CO.
79 Willard Ave., PROVIDENCE, R. I.



Suitable work holders to meet a great variety of production threading are available for work of irregular shapes as well as collet-type holders for round stock.

Threader is motor driven with 3 speed V-belt, has oil pump and reservoir, and offers an economical threading and tapping service at low cost.

TAYLOR "HI-EFF" SUPER - ACCURATE DRILLING MACHINES

Drill Truly Accurate Minute Holes as Small as .002" Diameter—Speeds to 40,000 R. P. M.

HYDRAULIC DYNAMOMETERS ECONOMICAL PRODUCTION FEWER SCRAP LOSSES STATIC BALANCING MACHINES
LONGER DRILL LIFE

Sensitive Drills to $\frac{1}{8}$ " Capacity also Available

Send for Descriptive Bulletins.

TAYLOR SALES CO.
2330 W. CLYBOURN ST. MILWAUKEE, WIS.

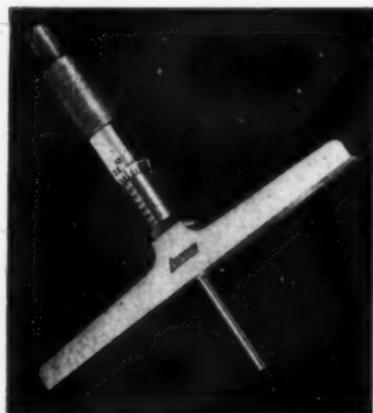


15—TORNOS AUTOMATICS

An eight page bulletin by George Scherr Co., 122 Lafayette St., New York presents many interesting features of this versatile Swiss high speed automatic screw machine.

16—SPOT WELDERS

Catalog 40 describes and illustrates the complete line of Ace spot welders made by Pier Equipment Co., Benton Harbor, Mich. In addition to detail information on the various models, the newly designed contactor and latest operating mechanism on the 1940 manually operated welders are fully explained.



PRECISION TOOLS, NOTED FOR ACCURACY, EASE OF USE AND DURABILITY.

THE LUFKIN RULE CO.
SAGINAW, MICH. • New York City



MILLING CUTTERS AND SPECIAL TOOLS

Made to order or converted from stock cutters.
1 to 3 days delivery.

By our special method we can save you \$5.00 to \$20.00
on special or converted cutters.

Centerless & Machine Parts Production Grinding.

**MACHINISTS TOOL GRINDING CO., 2834 W. LAKE ST.,
CHICAGO, ILL.**

17—OSCILLATING TAPPING MACHINES

A new bulletin presents the No. 4 and No. 10 high duty pneumatic oscillating tapping machines made by J. L. Kaufman Mfg. Co., Manitowoc, Wis.

18—BALL BEARINGS

Catalog No. 110 in handy pocket size, presents the full line of ball bearings produced by Nice Ball Bearing Co., Nicetown, Philadelphia, Pa. It is the most complete compilation yet presented by this Company, and includes many typical applications. It is printed on heavy stock and has a modern ring binding which permits the pages to lie flat.

19—HOISTS

Catalog G-1 employs 24 pages to good advantage in presenting the line of ratchet lever, spur gear gravity, and electric hoists, trolley and load binders made by Coffing Hoist Co., Danville, Ill.

20—LANDIS TOOL STORY

A neat and interesting 16-page booklet tells the story of Landis Tool Co., Waynesboro, Pa. History of the Company is sketched, with intimate shop views.

21—NIAGARA TOOLS

Bulletin 77-B covers the heavy slip roll forming machines built by Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.

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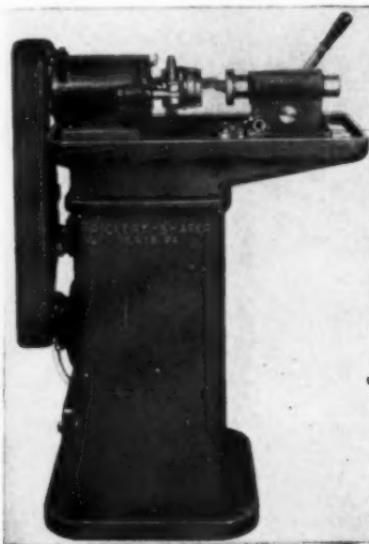
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Motor Driven Threading Machine

A new horizontal hand threading and tapping machine of compact design is announced by Rickert-Shafer Co., Erie, Pa. for use wherever "second operation" threading and tapping jobs are handled up to $\frac{1}{2}$. The popular R. & S. Model C self-opening die head mounted on the ball bearing spindle is automatically closed on the backward movement of the operating lever. The Model "C"

collapsible tap can be applied easily for tapping, resetting, is accomplished with the same backward movement of the operating lever.



V Jaws 6", 9" and 12" Long
For DRILL PRESS. Often used.

For DRILL PRESS. Often used
on Miller.

**Shaper,
Planer.**

Fig. 2. Without Jig Attachments

**DRILL
SPEEDER**

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H. S. Drilling Attachment

For use in Drillers from 20-in.
to largest Radial. Suits
Straight or T. S. Drills up
to $\frac{3}{4}$ " with Speeds to 3,000 Rev.
Increases Speed 3 times.

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Suitable work holders to meet a great variety of production threading are available for work of irregular shapes as well as collet-type holders for round stock.

Threader is motor driven with 3 speed V-belt, has oil pump and reservoir, and offers an economical threading and tapping service at low cost.

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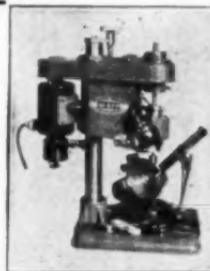
Drill Truly Accurate Minute Holes as Small as .002" Diameter—Speeds to 40,000 R. P. M.

HYDRAULIC DYNAMOMETERS **ECONOMICAL PRODUCTION FEWER SCRAP LOSSES LONGER DRILL LIFE** **STATIC BALANCING MACHINES**

Sensitive Drills to $\frac{1}{8}$ " Capacity also Available

Send for Descriptive Bulletins.

TAYLOR SALES CO.
2330 W. CLYBOURN ST. MILWAUKEE, WIS.



Chrome Face Steel Tape

A new line of steel tapes is announced by Lufkin Rule Co., Saginaw, Mich.

They are accurate steel tapes, chrome plated, with jet black markings and satin chrome-white surface. The surface is smooth, hard and easy to clean, and the Tape, being of metal throughout, will not crack, chip or peel.

Two brands are offered—"Anchor" in $\frac{3}{8}$ " and $\frac{1}{2}$ " width, in genuine leather case; and "Leader," the popularly priced line, $\frac{3}{8}$ " wide, in a durable imitation leather case. Included also are Chrome Face $\frac{3}{8}$ " and $\frac{1}{2}$ " wide Tapes on metal frames with Plumb Bob for tank gaging in the oil industry.

Porous Bronze Retainers

By Fafnir

For special applications, Fafnir Bearing Co., New Britain, Conn., offer ball bearings with oil-impregnated bronze retainers. The porous retainer structure is said to retain as much as 25% of its volume of oil, providing lifetime lubrication.



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ETCHERS and DEMAGNETIZERS

Let us tell you the many advantages of our new D. C. and A. C. models now available. Also, see our new line of Magnetic Parallels and Midget Chucks.

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DETROIT,
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$\frac{1}{2}$ " to 16" deep

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as well as many other tools for use in the Machine Shop.

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New Trade

1—UNIVERSAL GRINDING MACHINES

An attractive new 20 page bulletin introduces the Nos. 2, 3 and 4 B. & S. Universal grinding machines. All of the important details are shown in large scale illustrations, while the brief text and specifications leave little to the imagination. Address Brown & Sharpe Mfg. Co., Providence, R. I.

2—BETTER GEARS

A 52-page book entitled—"for Better Gears" has been released by Michigan Tool Co., 7171 E. McNichols Road, Detroit. It contains a number of articles on factors affecting gear production including "Gear Finishing", "Curve Shaving", "Lapping Hints" and "Locating Gear Troubles," in addition to descriptions of the complete line of Michigan gear production equipment.

3—TAP AND DRILL CHART

A handy tap and drill chart which saves time and eliminates guesswork when figuring on jobs in the machine shop has been prepared by the Dumore Co., Racine, Wis. It is printed on durable stock for tacking up in shops, drafting rooms and engineering departments.

4—SAWS AND FILE BANDS

A new four page bulletin presents the complete selection of Doall precision saws. Recommendations are given as to the correct saws for particular cutting jobs.

Another bulletin covers the 21 precision file bands manufactured by Continental Machines, Inc., 1300 S. Washington Ave., Minneapolis, Minn. Full size illustrations are given of each file segment in the various specifications furnished.

5—METAL SAWS

An attractive new 12-page catalog presents the complete line of Peerless automatic metal sawing machines. The machines are shown in large half tones. Important details are described and illustrated footnotes present the various kinds of work to be met in this field, giving definite information as to what may be expected in the way of performance. Copies may be had by addressing Peerless Machine Co., Racine, Wis.

6—COLORFLEX FLOOR RESIN

A new bulletin introduces Colorflex, a new pigmented resin which will penetrate concrete floors without injuring them—and also preserve wood floors. The first coat penetrates, presents a hard, enamel-like finish, which will withstand hard industrial traffic, and incidentally cure dusting concrete. It is produced by the Flexrock Co., 2305 Manning St., Philadelphia, Pa.

7—FUSE TROUBLE BOOKLET

"Fourteen Big Trouble Savers" is the title of a new condensed catalog folder issued by Trico Fuse Mfg. Co., 2948 N. 5th St.,

Literature

Milwaukee. It contains complete specifications and illustrations of powder-packed fuses, non-renewable fuses, plug fuses, thermal-time-lag fuses, tamper resisting plug fuses, clamps for locking fuse clips, heavy duty test clamps, fuse pullers and automatic lubricators.

8—MOLYBDENUM STEELS

The January issue of the Moly Matrix is devoted to the use of Molybdenum steels for vital parts of pile drivers. A pile driver is shown driving concrete piles. Sectional drawing shows hammer design and valve mechanism. A photo shows assembly of piston, ram and cam that operates the valve. A copy may be had from Climax Molybdenum Co., 500 Fifth Ave., New York City.

9—PRESSES AND STEEL FABRICATORS

Bulletin 50 issued by Hannifin Mfg. Co., 621 So. Kolmar Ave., Chicago, describes sensitive pressure control hydraulic presses in 25, 35, and 75 ton sizes.

Bulletin 49 issued by Rock River Machine Division of the same Co., 412 N. Main St., Janesville, Wis., presents the line of punching, shearing, notching, cutting off, squaring, splitting, riveting, bending, forming and straightening equipment offered.

10—VARIABLE SPEED PULLEYS

A new comprehensive folder on the Speedmaster variable speed pulley has been released by the Speedmaster Division of Continental Machines, Inc., tells how stepless speed delivery may be obtained and illustrates practical user applications.

11—SPEED REDUCERS AND ROTARY CONVERTERS

A new 98 page catalog issued by Janette Mfg. Co., 556 W. Monroe St., Chicago, presents the extensive line of Janette speed reducers in capacities from 1/50th to 10 h.p.

Bulletin J-8 covers the line of rotary converters.

12—STOCK GEARS

A new 246-page loose leaf catalog, No. 110, covers the Brad Foot Gear Works line of gears, reducers, cog belts, sprockets, bearings, pulleys and chain. For a copy, address the Company at 1301 S. Cicero Ave., Cicero, Illinois.

13—HYDRAULIC SHAPERS

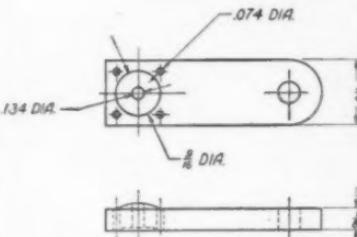
An unusually attractive six-page bulletin presents the 15" to 28" Hy-Draulic shapers manufactured by Rockford Machine Tool Co., Rockford, Ill. Extensive internal changes have been made in all sizes of these shapers, all of which are covered in the bulletin.

14—PRODUCTION AND MAINTENANCE AIDS

A new 12-page catalog presents an extensive array of items offered by Ideal Communicator Co., Sycamore, Ill. A few of the items included are adjustable motor bases, variable speed transmissions, industrial vacuum cleaners, wiring tools and accessories, etc.



don't drill small holes



On this stamping, made of $\frac{1}{8}$ " thick cold rolled flat wire, the four .074" holes were formerly drilled. It is now being pierced with DURABLE Patent Piercing Punches, and the Company making the piece reports runs of as high as 30,000 with one setting of the die. The four small holes are pierced in a separate operation because the die for large hole piercing, embossing and cut off was already in operation. While the statement is probably a little far-fetched, they claim that the complete cost of piercing the four small holes is less than their former upkeep cost of drills.

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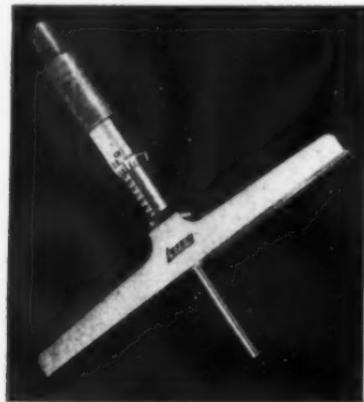
DURABLE PUNCH & DIE CO.
2224 W. Grand Ave., Chicago, Ill.

15—TORNOS AUTOMATICS

An eight page bulletin by George Scherr Co., 122 Lafayette St., New York presents many interesting features of this versatile Swiss high speed automatic screw machine.

16—SPOT WELDERS

Catalog 40 describes and illustrates the complete line of Ace spot welders made by Pier Equipment Co., Benton Harbor, Mich. In addition to detail information on the various models, the newly designed contactor and latest operating mechanism on the 1940 manually operated welders are fully explained.



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17—OSCILLATING TAPPING MACHINES

A new bulletin presents the No. 4 and No. 10 high duty pneumatic oscillating tapping machines made by J. L. Kaufman Mfg. Co., Manitowoc, Wis.

18—BALL BEARINGS

Catalog No. 110 in handy pocket size, presents the full line of ball bearings produced by Nice Ball Bearing Co., Nicetown, Philadelphia, Pa. It is the most complete compilation yet presented by this Company, and includes many typical applications. It is printed on heavy stock and has a modern ring binding which permits the pages to lie flat.

19—HOISTS

Catalog G-1 employs 24 pages to good advantage in presenting the line of ratchet lever, spur gear gravity, and electric hoists, trolleys and load binders made by Coffing Hoist Co., Danville, Ill.

20—LANDIS TOOL STORY

A neat and interesting 16-page booklet tells the story of Landis Tool Co., Waynesboro, Pa. History of the Company is sketched, with intimate shop views.

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Oliver Refines Cutter Grinder

The Oliver Instrument Co., Adrian, Mich., offer a new design of tool and cutter grinder, using the principle of the older type but embodying many desirable improvements.

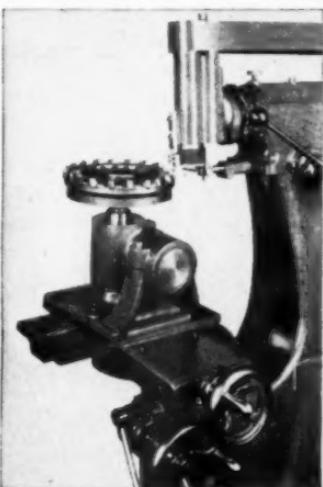
This machine grinds all types of milling cutters and reamers with a minimum number of attachments.

The illustrations show the machine with centers in place and the adjustable Timken bearing head with taper for mounting the various types of cutters for which it is adapted.

The method of grinding is reversed from that followed with the usual type of cutter grinder in that the work is held stationary and the grinding wheel traverses the cutting edge.

The grinding wheel is carried on the forward end of a ram which slides in a fixed bearing at the upper end of the pedestal. The motor is carried on the rear end of the ram and is belted to the grinding spindle.

and gear which in turn are actuated by a lever adjustable to the position of the operator.



The grinding wheel has a stroke of 10" and has a bearing 15" in length. It is traversed by means of a rack

The advantage claimed for this method of grinding cutters is that the operator stands in a natural position, and the work is directly in the line of sight. It is easier to guide the cutter against the lip rest and the ram and bearing are above the flow of emery and dirt, as are the operator's eyes.

The small number of fixtures required, means less time in adapting the machine to various types of cutters.

Face mills up to 14" in diameter can be ground on face and periphery at one setting of the cutter in the anti-friction bearing, and many odd types, such as dovetail cutters, are easily ground with the same fixtures.

The grinder can be supplied with or without fixtures and is adapted for single operation grinding for large grinding rooms.

Special fixtures have been developed for grinding round corners on end mills, for small end mills, for broach grinding, tap grinding, point thinning, etc.

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- Chucks, drill & tap
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- Chucks, magnetic
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- Steel
- Steel Stamps
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- Straightening, Mch.
- Stripping Units
- Swaging Machines
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- Tapping Mch. & At.
- Taps, collapsing
- Thread Grind. Mch.
- Thread Rolling Mch.
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- Tool Holders
- Toolmakers Instruments.
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- Tools, cutting
- Tools, filing
- Tools, lathe & plan.
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Lathe, 14" x 16" Prentiss, geared head.
Miller, B. & S. No. 2 universal, slotted nose, heads.
Miller, Cincinnati No. 1 plain, cone.
Rigidmill, Rockford No. 3, motor drive.
Shapers, 24", 26", G. & E., Stockbridge.
Turret lathe, Steinle 30", m. d., 8" hollow spindle.
Turret lathe, Bullard 36" vertical, rapid production.
Wheel press, Caldwell 400 ton hydraulic, 48" bet. bars.
Hydraulic presses, pumps, accumulators.

**Alex Zeev
2280 Woolworth Bldg., New York, N. Y.**
Drills, radial — 4' Dreses, gear-box motor drive;
3' American, gear-box single pulley drive.
Hammer, power, 400 lb., Beaudry "Champion".
Ironworkers, combination, No. 16 Pels, No. 92-11 Smith.
Lathes, 27" x 144" Greaves-Klusman, q. c., 3-step cone,
d. b. g.; 27" x 24" Lodge & Davis, l. c. g.; 20" x 10'
Walcott q. c., 3-step cone, d. b. g.; others.
Planer, 30" x 30" x 10' Niles, 2 heads on rail.
Threader, bolt, 18" Acme "Class A", double head, gear-
box, a.c. motor drive, with motor and dies.

Let us have your inquiries.

We buy used and surplus machine tools.

**Siegmans Machinery Co., Inc.
563 W. Washington Blvd., Chicago, Ill.**
Gear hobs, Barber Colman No. 12, (8).
Grinder, Landis No. 2 universal.
Hob grinder, Harris.
Hydraulic, press, 400 ton, complete with pump.
Press, punch, No. 7 Bliss Cons., b. g., m. d., $\frac{1}{2}$ h. p.
Radial drill, Hamilton, 34", gear box drive.
Shaper, bevel gear, 4 spindle, Gould & Everhardt.
Shaper, 21", Milwaukee, V-ways.
Spot welder, 100 KVA Gibbs, automatic head.
Swager, No. 34 Langlier.
Turret lathes, J. & L., 2 spindle, steel geared heads,
serial number over 50,000.

FOR SALE BY

**Globe Machinery Company
602 W. Lake St., Chicago, Ill.**
Boring mill, 34" Beaman & Smith, horizontal, s. p. d.
Lathe, Bridgeford, 28" x 12" heavy duty, quick change.
Pipe threader, Cox $\frac{3}{4}$ to 8" cap., motor drive.
Radial drill, Mueller 4", m. d.
Wire straightener, Wells, cap. $\frac{1}{2}$, $\frac{3}{4}$, 3/16, $\frac{1}{8}$.

**Rosenkranz, Weisbecker & Company, Inc.
2308 Singer Building, New York, N. Y.**
Boring mills, 60" Niles vertical, motor drive.
Drill, multiple spdl., No. 36 Natico, m. d., 20" round hd.
Gear cutter, 110" Newton, motor drive.
Grinder, Cincinnati 24" face mill, motor drive.
Grinder, 30" x 16" Landis, cylindrical, m. d.
Keyseater, No. 20 Catlin, m. d.
Lathe, 60" x 25" Gleason, motor drive.
Lathe, 42" x 18" Pittsburgh, quick change gear.
Miller, 24" x 24" x 12" Ingersoll, adj. rai., m. d.
Millers, 2 Ingersoll hor. facing mills, 9" spdl., m. d.
Miller, P. & H. vertical openside, keyseat, m. d.
Planer, 96" x 72" x 26" Pond, 3 heads, m. d.
Planers, 48" x 16", 42" x 20", 30" x 16" Gray, 4 heads.
Slotted, 18" Niles, vertical, m. d.

**Fairfax-Strafer Machinery Co.
132 Liberty St., - - New York, N. Y.**
Automatic, 48" Cleveland model A, modern, m. d.
Drills, 3" and 3½" Cincinnati-Bickford radials.
Drills, radial 6" Cincinnati-Bickford, s. p. d.
Drill radial, Amer. 4 sens., tapping attachment.
Gas furnace, No. 1 American, door opening 8" x 14".
Grinder, No. 14 Pratt & Whitney b. o., vert. surface.
Grinder, No. 6 Blanchard high power vert. sur., m. d.
Lathe, 17" x 18" LeBlond heavy duty, 3 step cone, d. b. g.
Lathe, 18" x 14" and 18" x 10" Lodge & Shipley's.
Lathe, 15" x 8" Lodge & Shipley, geared head.
Lathe, 20" x 17" Cleveland, geared head.
Lathe, 36" x 14" Lodge & Shipley, taper attachment.
Lathe, 28" x 24" and 3" x 36" J. & L., bar equip.
Miller, plain No. 24 B. & S., table work surf. 72" x 12".
Miller, No. 2 Cincinnati plain, high power, s. p. d.
Pipe machine, 48" Williams, motor drive.
Planer, 42" x 42" x 20" Gray, 4 heads, b. d.
Planer, 48" x 16" x 16" Gray, 4 heads, b. d.
Screw machines, (8) Garvin, 1" cap. wire feed.
Shears, squaring 10" x 16", Loy & Nawrath, arr. m. d.
Shear, squaring 10" x 16", Loy & Nawrath, arr. m. d.
Turret lathe, No. 4 A. W. & S., bar and chuck equip.

USED AND REBUILT MACHINERY FOR SALE BY

Bradley Machinery Co.

529 E. Jefferson Ave., - Detroit, Mich.
 Bar shear, Doty.
 Chucking grinder, No. 12 Bryant.
 Coining press, 150 ton EG-52, Ferracute, fine shape.
 Drill, 6-spindle Allen.
 Lathe, 21" x 10" LeBlond.
 1" x 6" New Britain.
 Turret lathe, 2" x 24" Jones & Lamson.
 Hundreds of other items, priced low.

Advance Machinery Co.
1032 W. Somers St. Milwaukee, Wis.

Brake, power, 8' 14 ga. Dreis & Krump.
 Grinder, cylindrical 6" x 18" Ott; 6" x 22" Norton.
 Grinder, auto. surface, Wilm., & mag. chuck.
 Lathe, 14" x 6" Monarch, q. c., d. b. g.
 Lathe, 15" x 16" Schumacher, B. & E., q. c., d. b. g.
 Miller, No. 2 Cincinnati plain, high power, s. p. d.
 Millers, No. 1 plain Kempsmith; No. 6 vert. Becker.
 Planer, 24" x 24" Gray.
 Slotter, 15" Miles B. with rotary t.
 Turret lathe, 18" Libby, s. p. d.

West Penn Machinery Company

Air compressors, 30 to 2500 cubic feet.
 Air comp. portable gas I-R 180 cu. ft.
 Blower, No. 4 Roots, capacity 2110 c. f. m.
 Bolt cutters, 2" & 3" Acme, b. d.
 Bolt threaders, automatic, Landis 8", m. d.
 Boring mill, 36" Bullard, side head.
 Boring mill, 42" Bullard, 2 heads.
 Boring mill, 66" Bettis 2 heads, belt drive.
 Bulldozers, Nos. 2, 4, 6, 9, 20, & 30.
 Crane, 10 ton Whiting, 43' Span, 220 d. c.
 Crusher, jaw, No. 4 Champion, b. d.
 Drill sharpener, Cinc., "Leymer," 18".
 Drill, 4" radial, Morris, speed box.
 Drill, radial 6" Reed-Prentice, single pulley drive.
 Drills, 4 spindle Avery, No. 2 m. t., s. p. d.
 Drills, upright 10" to 36".
 Engine, gas, 20 horse power Bessemere.
 Flanger, McCabe, 5" capacity, dies.
 Gear cutters, Nos. 1 & No. 2 Cincinnati, m. d.
 Gear cutters, 11", 18", & 24" Gleason.
 Gear tester, bevel 18" Gleason.
 Grinders, centerless Heim, m. d., 220/3/60.
 Grinder, drill, No. 31 Oliver, 18", m. d., 220/3/60.
 Grinder, knife 10" Bridgeport, m. d.
 Grinder, roll, 25" x 7".
 Grinders, D. E. 2-3 & 5 h. p., 220/3/60.
 Grinder, D. E. & No. 2 Cincinnati, m. d.
 Grinder, disc, No. 8-30 Besty, belt drive.
 Grinder, disc, No. 4 Gardner, motor drive, 220/3/60.
 Groover, No. 275-A Niagara, 6" 16 ga. motor drive.
 Hammers, 50 lb., 75 lb., 100 lb., 200 lb., Upright.
 Hammer, power, 100 lb. Bradley cushion helve.
 Hammers, Nos. 2-B, 3-B, 4B, 6-B, Nasel.
 Hammers, steam, forging & drop.
 Keyseater, No. 2 Mits & Merrill, belt drive.
 Lathe, 20x12 S. E., t. a., q. c. g., b. d.
 Lathe, 26" x 17" Putnam, q. c. g., d. b. g.
 Lathe, 42" x 18" Schumacher Boye, q. c. g., belt drive.
 Lathe, wheel, 78" x 44" Belmont, motor drive.
 Lathe, spinning 22" belt drive.
 Lathe, turret, W&S No. 2A & No. 3A s.p.d.
 Lathe, turret, 17x8 LeBlond double back gear 18".
 Locomotive, gas, 6 ton Milwaukee, 36".
 Miller, plain, No. 4 Cincinnati, b. d.
 Miller, vertical, No. 3 Knott, b. d.
 Miller, vertical, No. 5 C Becker, motor drive.
 Miller, vertical No. 6 Becker, motor drive.

FOR SALE BY

General Blower Company

401 N. Peoria St., - Chicago, Ill.
BLOWERS—FANS—EXHAUSTERS.
 For Dust Collecting — Ventilating.
 Oil and gas burners, cupolas, furnaces, etc.
 Roots—Connerville and centrifugal blowers.
 What are your blower requirements?

Nelson Machinery Co., Green Bay, Wis.

Bolt cutter, 24" National geared head, motor drive.
 Grinder, Cochrane Bly No. 11S auto. saw, cap. 10" to 32".
 Hobber, Barber Colman No. 12.
 Lathe, 16" x 16" South Bend, LC-SBG, reg. equip.
 Lathe, 18x8 Schumacher, SBG-LC, cab. legs, reg. equip.
 Lathe, 18x8 Reed SNG-LC, reg. equip. and taper att.
 Miller, No. 10 Pratt & Whitney.
 Pipe threader, No. 6 Bignall & Keeler, dup. improved,
 14 to 6".
 Press, No. 21 Bliss OBI, 2" stroke.
 Shaper, 16" Milwaukee, hol. ram, vee slide.

1210 House Building,

Pittsburgh, Pa.

Mixers, Sprout-Waldron, batch & liquid.
 Pipe machine, 2", 4", 6", 8" Landis-Oster-Williams.
 Press, forging, 150 ton United, steam hyd.
 Press, wheel 150 ton Caldwell, 42", b. d.
 Press, hydraulic 100-ton Southwark.
 Presses, OBI, No. 15 Bliss & No. 4 Toledo, 3" str.
 Press, No. 55 Toledo, bed 20x19.
 Press, double crank No. 5 Bliss, 2" stroke, b. d.
 Press, gap, No. 74 Bliss consolidated 4" stroke.
 Press, screw, No. 87 Niagara, hand power.
 Press, 6 spindle, Waterbury-Farrell.
 Press, arch, No. 30 Bliss, roll feed, b. d.
 Pumps, centrifugal 6", 4", 1", motor drive.
 Punch, EF Cleveland, 36" throat, 14" thru 1".
 Punch, multiple, 32" W & W, 10' 2".
 Riveters, air, hammer, spinning.
 Rolling mill, cold 9" x 18" motor drive.
 Saws, friction, Nos. 2, 3 & 4 Ryerson motor drive.
 Saw, cold, 48" Newton motor drive.
 Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
 Shears, alligator, 18", 2", 3", 4" & 6".
 Shear, Angle 6x8", Long & Allstatter, m. d.
 Shear, Niagara 42" x 16 ga., belt drive.
 Shear, 60" x 16" Niagara, 18" gap, b. d.
 Shear, 8x14 ga., Ohl, m. d., 110/220/1/60.
 Shear, circle, Niagara, 4" cutters, 16 ga.
 Shear, circle, No. 3 Bliss, 40" x 20 gauge.
 Shear, Guill., No. 5 H. & J., 42" rd., m. d.
 Shear, Guill., No. 2 H. & J., 32" rd., b. d.
 Shear, 10" x 4" Bliss, holddown b. d.
 Shear, plate, 80" x 4" Peis.
 Shear, plate, No. 6 H. & J., 84" x 4", m. d.
 Shear, plate, Covington 84" x 4", m. d.
 Shear, rotary 24" throat capacity 8", m. d., 220/3/60.
 Slitter, gang, No. 1 W-F, 18", belt drive.
 Slitter, gang, 36" Voder motor drive.
 Slitter, gang, 36" Bradcock, belt drive.
 Slotters, 6" & 8" Nelson.
 Straightener, 12" x 16" Shuster, b. d.
 Straightener, AS & TP 12" x 16", belt drive.
 Straightener, 48" Aetna-Standard, 17 roll 32" m. d.
 Straightener, No. 5 K & R, 32" square belt drive.
 Thread rollers, W-F No. 20-1".
 Tumbling barrel, 34" x 45", belt drive.
 Upsetters, 1" to 6".
 Welders, spot, 12, 13 & 18 K. V. A.
 Welders, arc, 200 & 300 amp. Lincoln.

USED AND REBUILT MACHINERY

FOR SALE BY

C. R. Daniels

1514 W. Capitol Drive, Milwaukee, Wis.

Bolt cutter, Landis, two spindle, 1" capacity.
 Brake, Chicago steel bending, 3" x 4" capacity.
 Drill, 24" Dehance, 3" cap. box column, s. p. d.
 Grinder, No. 12 Bryant chucking, with sizing equip't.
 Saw, No. 2 Ryerson friction with a. c. motor.

Wisconsin Gear & Engineering Co., Inc.
602 So. 2nd Street, - Milwaukee, Wis.

Bilgram Bevel Gear Generators
 Guaranteed to be in A-1 condition with all change
 gears and segments.

Lang Machinery Company

Air compressors, Ingersoll-Rand XB-2, 600, 888, 1200 & 1800 cu. ft. 100 hp. pressure, motor drive.
 Air comp., W.N.31 Sunbeam, 35 c. f. syn. m. d.
 Air comp., 14" x 17" Ing. Rand "ER-1", 464 c. f.
 Bolt cutter, "Landis, 14"-3" Acme, sgl., h. d.
 Bolt cutter, "Acme dbl. spdl. Landis heads.
 Boring mill, 24" Bullard, rapid production, m. d.
 Boring mill, 30" Bullard, threading attach., s. p. d.
 Boring mill, 42" Bullard, 2 swivel heads, s. p. d.
 Boring mill, 62" Bullard, 2 heads, grd. feeds, m. d.
 Boring mill, 42" Gisholt, 2 hds., r. p. t., m. d.
 Boring mill, 42" Colburn, grd. feeds, 2 hds., s. p. d.
 Boring mill, 52" Bausch, geared feeds, d. c. m. d.
 Boring mill, 73" N. B. F., 2 heads, r. p. t., m. d.
 Boring mill, 84" Pond, 2 heads, belt drive.
 Boring mill, 96" Belts, rapid traverse, m. d.
 Boring mill, 10" Niles, 2 heads, belt drive.
 Boring mill, floor type, 3" bar Niles, m. d.
 Brakes, power, 7" 10 ga., D. & K.
 Brakes, hand, 10" x 18 ga. Dreis & Krump.
 Buffer and polisher, 75" M. Marschke, 220/3/60.
 Cranes, (2) 8-ton Shaw, E.O.T., 50' span, 3 mtr.
 Drill, heavy duty No. 1 Baker, 24" capacity 23", s. p. d.
 Drills, radial, 24" Cincinnati-Bickford, m. d.
 Drills, radial, Fosdick, s. p. d.
 Drill, radial, 3" Mueller, t. a., rd. column, m. d.
 Drills, upright, 14" to 24", belt drive.
 Drills, 4-spdl. Avery No. 4, b. b. m. d.
 Drill, multi., No. 3 Avery 4 spdl., b. b. m. d.
 Gear cutter, 48" x 12" Gould & Eberhardt, s. p. d.
 Gear hobber, No. 18 H. Gould & Eberhardt, s. p. d.
 Gear hobber, 96" x 30" Gould & Eberhardt, m. d.
 Generator, 50 KW Westinghouse, 75 h. p., a. c.
 Grinder, disc, 18" Diamond, dbl. end.
 Grinder, disc, No. 6-20 Besley, a. c., m. d.
 Grinder, surface, No. 5 Grand Rapids, hyd. feed, m. d.
 Grinder, T & C. No. 2 Norton, belt drive.
 Hammer, 30-lb. Bradley upright strap.
 Hammer, 100 lb. Bradley cushion helve belt drive.
 Hammer, power, 300-lb. Bradley upright helve.
 Hammers, steam drop, 1000-lb. to 8000-lb.
 Keysavers, M. & M. No. 0-2", No. 4-24", No. 5-38".
 Keysaver, No. 2 Baker, str. 24", cap. 2", b. d.
 Keysaver, Baker, 36" stroke, 38" m. d.
 Lathe, 12" x 6" Prentice, geared head, q. c. g., s. p. d.
 Lathe, 14" x 6" Rockford, q. c. g., d. b. g., b. d.
 Lathe, 14" x 8" Pratt & Whitney, p. c. g., t. a., b. d.
 Lathe, 16" x 8" Hendey, q. c. g., t. a., b. d.
 Lathe, 18" x 10" Hendey gearhead, t. a., m. d.
 Lathe, 20" x 8" S.-B. & E., q. c. g., b. d.
 Lathe, 20" x 24" Lodge & Shipley, q. c. g., b. d.
 Lathe, 21" x 8" LeBlond, q. c. g., a. c., m. d.
 Lathe, 21" x 10" LeBlond auto. mfg., belt drive.
 Lathe, 24" x 10" Bradford, q. c. g., t. a., b. d.
 Lathe, 24" x 14" Schumacher & Boye, q. c. g., b. d.
 Lathe, 24" x 16" Lodge & Shipley, q. c. g., d. b. g., b. d.
 Lathe, 24" x 16" Lodge & Shipley, q. c. g., t. a., m. d.
 Lathe, 28" x 14" Schumacher & Boye, p. c. g., t. a., b. d.

FOR SALE BY

Industrial Machinery Company, Inc.**2200-2300 Fletcher Av. Indianapolis, Ind.**
 Turret lathe, No. 2 Acme full universal, m. d. 3-60-220.**B. D. Brooks Co., Inc.**
119 Broad St. Boston, Mass.

Sheet metal working machinery, hand and power.
 All types of new and reconditioned equipment.
 Apron brakes, press brakes, shears, folder.
 Bending rolls, corrugating rolls, forming rolls,
 Punches, beaders, rotary machines, stakes, etc.

28th St. & A. V. R. R.**Pittsburg, Pa.**

Lathe, 36" x 18" American, p. c. g., t. a., b. d.
 Lathe, 36" x 26" New Haven, p. c. g., b. d.
 Lathe, 36" x 22" L. & S. grd. hd., q. c. g., t. a., m. d.
 Lathe, 51" x 37" New Haven, triple geared, motor drive.
 Lathe, turret, No. 2 Warner & Swasey, b. d.
 Lathe, turret, No. 3-A Warner & Swasey, s. p. d.
 Millers, duplex, 18" and 24" Cincinnati automatic.
 Miller, hammer, No. 6 Whitney, b. d.
 Miller, plain, No. 9 Brown & Sharpe, b. d.
 Miller, plain, No. 12 Brown & Sharpe, grd. feeds, b. d.
 Miller, plain, No. 2 Cincinnati, tbd. 46" x 16", b. d.
 Miller, plain, No. 24 Hendey-Norton, tbd. 52" x 11", b. d.
 Miller, plain, No. 24 LeBlond, tbd. 52" x 11", b. d.
 Miller, plain, No. 28 Ohio, table 68" x 14", belt drive.
 Miller, plain, No. 3 Cincinnati, b. d.
 Miller, plain, No. 3 LeBlond, table 72" x 16", belt drive.
 Miller, plain, No. 24 Brown & S. 80" x 17" b. d.
 Miller, Mfg. Type, No. 2-A Milwaukee, s. p. d.
 Miller, universal, No. 3 Brown & Sharpe, s. p. d.
 Miller, universal, No. 3 Brown & Sharpe, b. d.
 Miller, vertical, model "B" Becker tbd. 87" x 12", s.p.d.
 Miller, vertical, No. 3 H. Beckt. er, m. d.
 Pipe machines, Landis 4" to 2", belt drive, (2).
 Pipe machines, Nos. 304-B, 308-A 308-A Oster, m. d.
 Pipe machine, 9" Williams, 23" to 8" motor drive.
 Pipe machine, No. 118 Merrill, 22" to 17", motor drive.
 Planer, 30" x 24" Ames-Bemis t-Pond, m. d.
 Planers, 36" x 36" x 10" Cincinnati, 2 heads, belt drive.
 Planer, 72" x 72" x 24" N. J. P., 4 heads, rev. m. d.
 Planer, open-side, 45" x 48" x 12" D. & H. 3 hds., m. d.
 Press, arch, No. 52 Toledo, str. 44", m. d.
 Press, No. 95 Bliss, dbl. crk. str. 24", m. d.
 Press, No. 82 Cleveland, stroke, 24", roller feed, m. d.
 Press, toggle, No. 24-A Bliss, stand.
 Presses, wheel, 100, 200 & 250-ton Hydraulic.
 Presses, Nos. E3 and E4 Keller, motor drive.
 Punch & S., Cleveland, 36" throat, 18"-1", m. d.
 Punch 36" Deep Throat, b. d.
 Punch, lever, No. 58 Niagara, 36" throat.
 Riveting hammer, No. 84 B high speed, m. d.
 Roll, bending, 7" x 1", Pyramid Type, b. d.
 Shapers, 16", 20", 24", 28", belt or motor drive.
 Shaper, 24" Columbia, d. b. g., gear box, m. d.
 Shaper, open-side, 26" Universal, Type A, m. d.
 Shear, No. 19 Canton alligator, 24" square, m. d.
 Shear, alligator, No. 61 Carlin, 3" round high knife.
 Shear, Alligator, No. 7 United Engg. & Fdy. Co.
 Shear, angle, No. 62 Whitney, 3" x 3" x 1" hand.
 Shear, billet, No. FV-23 Peil, 3" round cap., m. d.
 Shear, rotary, No. 10 Quickwork, 14 ga. 40" throat.
 Shear, square, 36" x 16 ga. Niagara, foot operated.
 Shear, plate, No. 5 H. & J., 90" x 16"-36" throat, m. d.
 Slotter, 8" Beets, table 20" dia. b. d.
 Slotter, draw stroke, Baker, cap. 38" x 38", m. d.
 Straightener, & cut, No. 1 Shuster, strip 24" x 8".
 Straightener, No. 1 Kane & Roach cap. 8" rd. m. d.
 Welders, 250 amp. Gen. Elec., 300 amp. Lincoln.
 Upsetter, 14" Ajax, steel bed, m. d.

USED AND REBUILT MACHINERY FOR SALE BY

E. L. Klauber Machinery Co.
3221 Olive St. - St. Louis, Mo.
 Automatic, Cleveland Model A, 1"-12" capacity.
 Band saw, 12" metal working, Klemm.
 Heading & flanging machine, automatic Cameron.
 Lathe, 16" Lehmann, Monarch, q. c. g., d. b. g.
 Presses, No. 35 Swaine o.b.i., No. 1 Perkins notching.

Davis Machinery Company
1-3-5 So. St. Clair St. Toledo, Ohio
 Brake, 4"x3/16" Chicago, power, leaf type, m. d.
 Gear hobber, No. 12 Barber-C., dbl. over-a. rapid-trav.
 Lathe, 14"x8" Hendey, q. c. g., motor dr.
 Milling machine, No. 3 Cin. univ., hi. p., div. hd.
 Press, 50 ton H. & W., dieing machine, m. d.

Chas. E. Lowe Co.
174 Pearl Street Hartford, Conn.
 1" Model G Gridley, m. d.
 1" Model G Gridley, m. d.
 1" Model G Gridley, m. d.
 2" Model F Gridley, m. d.
 Nos. 24, 452 New Britain chucks.
 2" 4" Model "A" Clevelands, b. d.
 2" 4" Model "A" Clevelands, var. m. d.
 4" Model J, s. a. Gridley.
 No. 60, No. 6, No. 3 Brown & Sharpe.
 No. 52, No. 55 Acme, m. d.
 40 sets of round collets and pushers for 14" G Gridley.

Standard Machinery Co.,
347 Indiana Ave. Grand Rapids, Mich.
 Automatic, 12" Gridley, model F.
 Automatics, Nos. 172, 206 & 452 New Britains.
 Boring mill, 42" Bullard vertical.
 Boring mill, 24" Lucas horizontal.
 Drill grinder, Sellers 12" capacity.
 Grinder, No. 24 Walker surface.
 Grinder, No. 4 Badger disc, motor drive.
 Lathes, Porter-Cable Mfg. (6).
 Miller, model C-I Becker heavy vertical.
 Radial drill, Western, 38" arm.
 Shaper, 34" Hamilton.

Russell Machine Co.
435 Oliver Bldg. Pittsburgh, Pa.
 Boring mill, Bullard, 42" New Era type.
 Boring mill, 42" Gisholt, 3 heads, m. d.
 Boring mill, 16" Niles vertical.
 Gear hobber, No. 18H Gould & Eberhardt, s. p. d.
 Hammer, 5000lb, double frame, NBP steam.
 48" Morton Keyway cutter, cap, 38" wide.
 Lathe, 26"x13" Chard, hvy. duty, q. c. g., t. a.
 Lathe, 26-48"x14" McCabe 3-in-1, l. c. g., b. d.
 Lathe, 52"x23" Pond triple geared.
 Pipe cutting and threading machine 6" Merrill.
 Planer, Cincinnati 36"x36"x10" table.
 Press, No. 5 Bliss type, 2" stroke, b. d.
 Press, wheel, 200-ton Niles, b. d.
 Punch-press Cleveland grd. roller feed, 100 ton pr.
 Shaper, 34" Gould & Eberhardt.
 Shaper, 24" Columbia, d. b. g., gear box, m. d.
 Shear, alligator, United, cap, 8" square.
 Shear, plate, No. 5 H. & J. cap, 90"x8"; m. d.
 Sorme cutter, No. 7 Z, & H. m. d., cap, 18" dia.
 Upsetting machines, 22, 32, 4 and 5" Ajax iron bed.

FOR SALE BY

Wm. C. Johnson & Sons Machy. Co.
1211 Hadley St., St. Louis, Mo.

Air compressors, 15 in stock.
 Automatic, cone, 1", 15", 4 spindle, complete.
 Bolt threaders, 1", 15" & 2" Acme.
 Boring machine, 44" Betts.
 Boring mills, 6"-8" 44" Niles.
 Drill, Allen 4 spindle, No. 3 taper, 12" overhang.
 Drill, No. 2 Fox, 6 spindles.
 Drill, Moline hole hog, 8-sp. No. 4 Morse taper.
 Drill, radial, 4" Dreses and 4" Fosdick; 3" Mueller.
 Gear hobber, No. 3 Adams.
 Hammers, 300 lb. Beaudry, 75 lb. Bradley, 50 & 100 lb. Little Giant.
 Lathe, 14"x8" Hendey belted m. d. taper attach.
 Lathe, 18"x8" Boye & Ennes, q. c.
 Lathe, 27"x16" L. & S. q. c. g.
 Miller, Cin. production type, 57"x11" table.
 Miller, Pratt & Whitney, spine.
 Miller, No. 4 LeBlonde universal cone drive.
 Pipe machines, 2"-4"-6"-8"-12".
 Presses, Nos. 2, 3 & 4 Marshalltown.
 Presses, 3, hydraulic pump & accumulator.
 Press brake, 10' l. x 10 ga. Ohl.
 Press brake, 8' 6" for 4 ga. m. d., 95% new.
 Punch, Cleveland E. F. art jaw, 47" thr with Lysholm spacing table, m. d., one-man control.
 Rolls, corrugating, 24" dia., 17 removable dies.
 Roll, plate straightening, H. & J. No. 2, like new.
 Saw, 12"x12" Racine and Nos. 2 & 1 Marvels.
 Shapers, 12"-16"-20"-24".
 Sq. shear, No. 498 Bliss, 16'.
 Punches, shears, bulldozers.
 Testing machine, 100,000 lb. Riehle.

Large stock guaranteed electric motors. Any size.

Jones Machine Tool Company

Front & Pike Sts., Cincinnati, Ohio

LATHES
 24"x30" Lodge & Shipley, q. c., cone drive.
 18"x8" Monarch grd. head, motor drive.
 16"x10" Lodge & Shipley q. c., cone drive.
 18"x10" Hendey tie bar head, q. c., cone drive.
 20x14" Hendey, tie bar head, q. c. cone drive.
MILLERS & GRINDERS
 No. 3 Millsmith plain c. d. No. 2 W. & M. Grinder.
 No. 2 hvy. B. & S. plain c. d. No. 3 W. & M. Grinder.
 No. 25 hvy. Ohio univ. c. d. No. 35 Abrasive m. d.
 No. 4 Cincinnati, plain c. d.

PRESSES
 No. 6-A Toledo, open back inclinable.
 No. 6-H Toledo, open back inclinable, geared.
 No. 17 Stoll open back inclinable.
 No. 6-A Toledo incl. back geared.
 No. 7B Bliss, s. s. dbl. crank, tie rod frame, bed 60x34.
 Michigan s. s., dbl. Crank, 72" between housings.
 All sizes inclinable and horning presses.

SHEARS
 48"x16 gauge Queen City, 12" gap.
 52"x10 gauge Niagara, 15" gap.
 52" Niagara, 16 gauge, 15" gap.

MISCELLANEOUS
 Boring mill, 42" King vertical.
 Hack saws, 12x15 & 6x6 Racine; 6x6 Peerless.
 Keyseater, No. 1 Davis motor drive.
 Planer, 36x12 Gray, 2 heads.
 Shapers, 17 & 21" Smith & Mills & 34" G. & E.
 4" Landis pipe machine.
 11" Gleason bevel gear generator.

**A LARGE STOCK ALWAYS ON HAND—
LET US HAVE YOUR INQUIRIES**

USED AND REBUILT MACHINERY

FOR SALE BY

Mayer Machinery Co.
742 Osage Street Fort Wayne, Ind.

Air compressors, 20 in stock, all sizes.
Automatics, 14" Gridley, model G, m. d.
Automatics, 5A and 6A, m. d.
Press, Toledo 554, tie rod, roll feed, m. d.
Press, R. & K. No. 2A, m. d.
Grinder, Norton 6x32 and 10x36, m. d.
Welders, 200 amp. Lincoln; 400 amp. Westinghouse.

H. H. Pelz 5140 Woodlawn Ave. Chicago, Ill.

Lathe, 30"x15", 7' between centers, patent head, quick change gears, driven by d. c. motor, 15 h. p., 220 v. low price.
Planer, 30"x30"x10' Gray, 1 hd., m. d. with motor.

Marr-Galbreath Machinery Company

Air compressors, 7x8" Chicago, NSB.
Air compressors, 9x6" Sullivan, WG-4.
Blowers, (furnace) No. 2 Knight; No. 3 American.
Blower, pressure, No. 11-PB Am. 14375 cfm., m. d.
Bolt cutter, 14" Bandis, sgl. head.
Bolt cutters, 1" Greenfield, 12" Landis.
Boiling mill, 30" Bullard vert., threading attach., b. d.
Brake, 6"x18 ga. PS & W. head.
Brake, 6"x12 ga. Chicago, power, belted.
Brake, crimp and corrugating, 10"x16 ga. Keene.
Driller, horiz., 6 spindle Nat'l. Acme, No. 3 chucks.
Drill, 3" radial, Dresser rd., swing table, t.a.
Drills, gang, 3 & 4 spindle, 1 to 4 MT.
Exhauster, No. 35 Buffalo, outlet 12x14", m. d.
Fan, ventilating, 24" American, m. d., 1/60.
Fan, 24" Sirocco, 4900 cfm. 4" wp., m. d.
Forging machine, 12" Acme, all steel, side shear.
Furnace, hardening, 8x12" G. & B., blower, m. d.
Furnace, T. J. 25x23x12" ID, 17000 f.
Gear pinion, No. 3 Sloan & Chase, auto. bench.
Grinder, plain No. 2 B. & S., s. p. d., collet att.
Grinder, No. 21 Landis, plain, 10x30", c. s.
Grinder, flexible shaft, s. p. d., Mall 1/60.
Grinder, tool & cutter No. 12 Cincinnati, plain,
Grinder, portable surface, 6-8-OA, motor, 3/60.
Grinder, univ. C. & R. No. 3 B. & S.
Grinding spindle, Excello No. 39, bracket 5002.
Hack saws, No. 3 & 4 Economy, belted.
Hack saws, No. 7 & 14 Atkins, belted.
Hammers, 50 lb. Boss, No. 2, with dies, belted.
Hammer, 100 lb. Little Giant, belted.
Hammer, 200 lb. Bradley upright helve, motor drive.
Hammer, 300 lb. Beaudry "Champion", b. d.
Hammer, 400 lb. Bliss board drop (rebuilt).
Hammer, 1000 lb. Chbg. steam drop, double frame.
Hoists, 10-ton Euclid, 3/60/220 (2).
Keyseater, No. 2 M. & M., cap, 18"x12" belt.
Lathe, Morton, cap, 24"x24", s. p. d.
Lathe, No. 4 Rivett, bench, draw-in-att.
Lathe, 11/16"x4" Artisan, q. c. g., s. p. d.
Lathe, 7x30" Dalton, type B-4, screw cutting.
Lathe, 15/32"x8" Sebastian gap bed cone.
Lathe, 16, 32"x8" Fay & Scott, sliding bed, gap, cone.
Lathe, 18"x8" L. & S., b. d. g., Culman, m. d.
Lathe, 18"x10" South Bend, plain change.
Lathe, 20"x8" LeBlond, q. c. g., 5-step cone.
Lathe, 20"x12" American geared head, m. d.
Lathe, 22"x12" Rahn-Larmon, pl. change gears, t. a.
Lathe, 27"x10" L. & S., 5-step cone, q. c. g.
Lathe, 24"x20" L. & S. selective head, m. d., t. a.
Lathe, 26"x10" Wolcott, q. c. g., b. d. g., 28" h. s.
Marking machine, No. 3 Noble & Westbrook.
Miller, hand, No. 2 Kempsmith.
Milling machine, univ. No. 4 B. & S. cone.
Milling machine, pl. No. 3 Cincinnati, cone.
Motors, 15 h. p., West. 3/60/220-440/870 rev.

FOR SALE BY

D. E. Dony Machinery Co.

47 Laurelton Rd., - Rochester, N. Y.

Die casting machines, No. 4 & No. 5 Madison-Kipp.
Diamond boring machs., Coulter 2 spindle vert., m. d.
Lathe, Schumacher & Boye 40"x14".
Pipe machine, Saunders 14".
Planer, Pond 42"x42"x14", 4 heads.

Bleser Machinery Company

209 N. Sixteenth St., - Springfield, Ill.

Angle shear, 3"x3" angles, 12" round, 34" flats....	225
Lathe, 16"x8" South Bend, like new.....	275
Lathe, 36"x18" L. & S., q. c., arranged m. d.....	1500
Shaper, 32" American, arranged motor drive.....	395
Trip hammer, 200 lb. Champion.....	250

57 Water St.,

Pittsburgh, Pa.

Motors, 25 h. p. Allis-Chalmers 3/40/220/680 rev.	
Motors, 30 & 40 h. p., Allis-Ch. CS 3/60/220/870 rev.	
Nailing machine, No. 6 Morgan, 6" thr. 3/16".	
Nibbling machine, No. 1 Campbell, 6" thr. 3/16".	
Nut runner, No. 4 B. & D. motor 110 v.	
Pinion cutter, No. 3 Sloan & Chase, capacity 1x1".	
Pipe machine, 4" Williams, cap, 4" to 4", m. d.	
Pipe machine, 16" Wieland "Standard", m. d.	
Planer, 26"x26"x8" Niles, 1 hd., belt m. d.	
press, hyd. vert., 30-ton Lourie, 18" between posts.	
press, foot, Lewinwaite, wt. 400 lbs., (2).	
press, hon., No. 16" Bliss, plain, stroke 14".	
presses, United, 56-ton o. b. str. 18", shearblade, m. d.	
press, O. B. I. 18" Bliss, 12" & 2" stroke (2).	
press, O. B. I. 21" Bliss, 1" stroke, m. d. (2) (cheat).	
press, O. B. I. 22" Bliss, 2" stroke, m. d. (welded).	
press, o. b. No. 3 Perkins, pl. str. 18".	
press, o. b. i. No. 1 Thomas, 2" stroke, m. d.	
press, punch, P-2, Ferracite, m. d.	
press, punch type, equal 54" Bliss, 10,000 lb.	
press, sgl. cran., 58" Toledo, str. 8".	
press, wheel, 60-ton W-S. 30"x8".	
press, wheel, 200-ton, 30"x16", pump, m. d.	
Punch & shr., comb., No. 5 Hulko, hand, cap, 1" x 1".	
Punch & shear, S. E., 1" tht. 1" x 1" S. & A.	
Punch & shear, S. K., 6" tht., No. 3 L. & A., rapid a.	
Riveter, 100 & 125 Grant, m. d.	
Rolls, 30"x6" United, 2-rolls (for leather).	
Saws, metal, 4x4" Napier, m. d. (2).	
Screw machine, turret No. 1 Garvin, w. f.	
Shaper, 16" Blount, (planer drive).	
Shaper, 16" G. & E. motor 3/60/220 (old).	
Shaper, 20" Kelly, b. g. crank, cone.	
Shaper, 21" Averbeck, b. g., cone.	
Shaper, 21" American, b. g., crank, cone drive.	
Shaper, 21" Milwaukee, b. g., V-ram.	
Shaper, 25" American b. g., gear box, m. d.	
Shear, bar, No. 3 National, 24" blade, cap, 24" sq., m. d.	
Shear, Blocks & Blades 52"x8" cap, 1500 lb.	
Shear, B-26 Stanley Unisharp, cap, 18", m. d.	
Shear, O-36 Stanley Unisharp, cap, 14 ga., m. d.	
Sprue cutter, No. 172 Bliss, belt.	
Tapping machine, # Pratt & Whitney, b. d.	
Testing machine, 1000 lb. Olsen hyd., hand.	
Testing machine, 100,000 lb. Riehle, m. d.	
Tiering machines, 600 and 1000 lb. Economy, hand.	
Tumbling barrel, No. 3 Baird, tilting.	
Turbines, 100 h. p. Westinghouse, 900 rev.	
Turret lathe, 38"x36" Acme, s. p. d.	
Turret lathe, 18"x6" Springfield, Fox Monitor.	
Upsetter, 12" Acme, all steel.	
Welder, arc, 280 amp., a.c. Hampton (new).	

USED AND REBUILT MACHINERY

FOR SALE BY

Acme Equipment Company
128-H So. Clinton St., - Chicago, Ill.

Boring mill, Colburn 42", 2 side hds., center bar, hd.
Brakes, 8' 10 ga., 4" I", 10", 14 ga., 8" 18 ga.
Lathe, 12" 25", 14" 26", 18" 28", 21" 30", q. c. g.
Milling machine, No. 2 B. & S. univ. with vert. head,
No. 2 Rockford.
Nibblers, Campbell 6" thr., 3/16" cap.; 24" thr. 3/16" cap.
Presses, punch, o. b. i. No. 0, 1, 2, 3, 4, 5.
Shapers, 14", 16", 18", 20", 24" strokes.
Shears, 10" 1/2" cap., m. d., 48", 14 ga., b. d.
Unishaper, No. 64, 14 ga., cap., 34" thr., m. d.

The Reeve-Fritts Company
28 N. Clinton St., - Chicago

Boring machine, No. 1 Barrett, cylinder.
Cut-off machine, 12" Peter's abrasive.
Gear hobber, No. 1 Adams Farwell.
Lathe, No. 4 Cataract.
Lathe, 22" x 14" Davenport, q. c. g.
Press, No. 2 Bliss (solid back).
Saw, cold, Lea-Simpson, 64".
Screw driver, No. 2 Reynolds.
Screw machine, 1" Cleveland automatic.
Tapper, No. 1 Garvin, 4" vertical.

Fred W. Gaul
6316 Theodore St., - Detroit, Mich.

Beader, Niagara No. 2A, 26", m. d.	250
Drill, 3" and 3½" Cincinnati Bickford radial.	
Gear hob., Spur & worm, cap. 100", 1 pitch, c. i.	1750
Grinder, Brown & Sharpe No. 13 universal.	900
Grinder, Brown & Sharpe No. 11, s. p. d.	1000
Grinder, Brown & Sharpe No. 12, c. s./...	350
Grinder, Brown & Sharpe No. 3 universal, c. s./...	1250
Marker, Martin hydraulic, m. d., equal to new	500
Press, Ferracutte D-54 s. s. 5" stroke.	350
Spot welder, 28 KVA Winfield.	350

Moser Machine Tool Sales
3250 North 54th St., Milwaukee, Wis.

Automatic, No. 0G B. & S. h. s., 220 v. m. d., 98% new,
60 day's service.
Automatic, Pay 14" x 19" centers, 10 h. p., 220 v. motor.
Balancing machine, No. 3-C Tinus Olsen dynamic
and static bal., motor driven.
Boring mill, Hurford 28" vert. index turret, b. d.
Boring mill, Nitto 47" vertical, 2 side heads, b. d.
Chucks, No. 24 New Britain automatics.
Drill, No. 90S Garvin dbl. end hole, 4" cap., p. f.
Grinder, dr. 3" No. 51 Oliver, 230 V. m. d.
Grinders, Nos. 65 and 70 Heald internal.
Grinder, No. 1 Gardner dbl. end motor on spindle,
univ., 220 V. pan, pump and piping, p. pract. new.
Lathe, 20" 26" American, all geared heads, s. p. d.
Miller, No. 1 U. S. hd., b. d.
Miller, Ingersoll, 42" x 36" x 20" table, 2 side hds., 2 rail
heads, motor drive.
Miller, 23" x 32" Putnam Lincoln type, p. f., b. d.
Miller, No. 12 Garvin, p. f. to table, b. d.
Miller, No. 2 Cincinnati plain, s. p. d.
Radial drill, 4"-11" dia. col. Amer. trip. gd., 24 spdl.
speeds, s. b. s. p. d.
Radial drill, Dresses 5"-13" col. univ. ext. table, b. d.
Screw machines, Nos. 0, 1 & 6 B. & S. hd., wire feed,
power feed to turret.
Screw machine : No. 2 W. & S. hd., p. f. to t., air chuck.
Turret lathe, Gisholt 24" d. b. g., 4-jaw, chuck, b. d.
Turret lathe, Greenlee 24" x 26" flat, auto. chuck, s. p. d.
Welder, butt, 20 k. v. a., Thompson, cap. 4" rd. stock.
Wire str., F. B. Schuster, 4" cap., excellent condition.

FOR SALE BY

Segal Machinery Company
117 S. Clinton St., - Chicago, Ill.

Automatics: 5A & 6A Potter & Johnston and Fay's.
Brakes, 8"-10 ga., 12"-13" D. & K. power.
Broaches, V-18 American; Nos. 1 and 3 LaPointe.
Gear hobs, No. 3 & No. 12 Barber-Colman, m. d.
Grinders, No. 33 Abrasive, mot. dr., 15" cup wheel, (2).
Lathes, 12x5, 14x5, 16x5, 20x8, Mon-LeBlond—q. c. g.
Millers, No. 2 B. & S. & Kemp, univ. fully equipped.
No. 2 Garvin duplex; 24" Cincinnati duplex.
Nibblers, Nos. 15 & 2 Campbell, 4" cap., 24" throat.
Planers, 42x42x12 Cinc. 30x30x6 open. Det. & Har.
Punch presses: No. 3 Walsh & Rock; No. 540 Max.
Ams. str. sid. — Back Gear, 8" stroke, No. 4 Bliss-Con.
Screw machines, No. 4 & 6 W. & S., Plain & Universal.
Shapers, 16", 20", 24", 28", G. & E., Mill. and Amer.
20" Rockford, hy-service, motor drive.
Partial list — Send us your inquiries.

Reliance Machinery Sales Company
1405 Brighton Place, N. S. Pittsburgh, Pa.

Air compressor, 8x8 Chicago, 129 cu. ft.
Borer, car wheel, for 42" wheels.
Boring mill, 51" Hausch, 2 heads, rapid traverse.
Bulldozer, No. 9 W. W., 24" stroke, crosshead 16x80".
Drill, radial, 6 Reed-Prentice, s. p. d.
Grinder, No. 2 Brown & Sharpe surface, motor drive.
Miller, No. 4 Cincinnati, plain, cone.
Miller, No. 2 B. & S., plain, table 16"x34", cone.
Miller, No. 6 Becker, 52" feed.
Planer, 36" x 36" x 12" Cincinnati, 2 heads.
Press, No. 2 Toledo, o. b. i., 4" stroke.
Press, consolidated, a. s. 3" shaft, 69" stroke.
Press, No. 82-C Toledo dbl. crank, 8" shaft, 44" wide.
Press, No. 94-A Toledo dbl. crank, 6" shaft, 6" stroke,
40" wide.
Presses, o. b. i., Nos. 4 & 5 Toledo.
Shapers, 16", 20", 24", various makes.
Shear, open front bar, 7x1 flats.

What do you need? What have you for sale?

Joseph Hyman & Sons,
Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 206C Toledo, gap, dbl. crank, tie rod, 64"-7" crank.
No. 250C Toledo, dbl. crk., 60", stroke 11", crk. 74"-8".
No. 3C Bass double crank, flywheel, 79", crank 5".
No. 138 Bliss double crank, flywheel, 79", crank 5".
Nos. 92D, 91C, 90D, Toledo dbl. crank presses.
Nos. 54, 55, 57, 57A, 58 Toledo, geared straight side.
No. 209 A Toledo, tie rod, geared, 6" stroke.
No. 55 A Toledo, geared, straight side.
No. 512 Niagara, geared, straight side, 69" shaft.
No. 58G Garrison, tie rod, straight side, 8" crank.
Nos. 85, 94C tie rod Bliss toggle presses.
No. 1644 Toledo toggle, tie rod.
No. 910B Stoll, toggle press, 74" crank, 54" draw.
No. 40 & 39B Bliss toggle, 14" & 13 Toledo, housing.
No. 662 Toledo, 250 ton knuckle joint, coining.
150 ton No. 1 FWG 52 Ferracutte, 75 ton EG 51 Ferracutte.
500 ton American Can Coining, 150 ton No. E51 Ferracutte.
200 ton No. 59 Bliss, 250 ton Waterbury F. coining.
100 ton No. 21 Bliss, 50 ton No. 2 Bliss coining.
No. 3W Bliss wiring presses, (2).
Bliss roll forming machine, 5 pairs rolls for stock up
to 22" wide, 4" bearing, weight 25,000 lbs.
Squaring shears, various sizes.
Gang slitter, 60" Braddock, type H.
These and hundreds of others of popular makes and
sizes, are in stock at our warehouse here.
Rebuilt and Guaranteed.

USED AND REBUILT MACHINERY

FOR SALE BY

Wigglesworth Machinery Co.

199 Bent Street Cambridge, Mass.

Automatics, No. 6-A Potter & Johnson, (2).
 Boring mill, 24" Bullard, side head.
 Boring mill, 35" Bullard, New Era, (2).
 Drill, 4-spindle Leland-Gifford.
 Grinder, 14" model B, Pratt & Whitney, m. d.
 Grinder, No. 33 abrasive, m. d.
 Grinder, No. 16 Blanchard, m. d.
 Grinder, No. 2 Brown & Sharpe-Reid.
 Lathe, 16" x 12' Walcott, q. c. g.
 Lathe, 18" x 12' Rockford, q. c. g.
 Lathe, 20" x 18' Lodge & Shipley, grd. hd., late type.
 Lathe, 22" - 40" x 18' Fay & Scott, gap.
 Miller, No. 2 Brown & Sharpe, (2).
 Miller, No. 2 Cincinnati hi power, s. p. d.
 Miller, No. 3A heavy Brown & Sharpe univ., m. d.
 Miller, No. 4 Knight-jig borer—m. d.
 Planer, 42" x 42" x 10' Detrick & Harvey (2).
 Press, No. 2 V & O, back geared, m. d.
 Radial, 4" American triple purpose, m. d.
 Spline millers, 6" Taylor & Fenn (4) m. d.
 Spline miller, 4" Pratt & Whitney.
 Turret lathe, No. 3 Foster, timken bearing, m. d.
 Turret lathe, No. 4 Brown & Sharpe, wire feed.
 Turret lathe, 41" Gisholt, steel ways.
 Turret lathe, 24" x 24" J. & L., steel head.
 Turret lathe, 2 spindle, J. & L., steel head.
 Send for Complete List.

The State Machinery Co., Inc.
865 Congress Ave., New Haven, Conn.

Drill, Pratt & Whitney No. 13 multiple spindle.
 Drilling machine, Pratt & Whitney No. 1 gun barrel.
 Grinder, Brown & Sharpe No. 14 cylindrical.
 Millers, Pratt & Whitney 8" and 10" automatic.
 Millers, Cincinnati 12" and 18" automatic.
 Polishers, production belt and wheel.
 Screw machine, Gridley, 34, multiple spindle, model F.
 Turret lathe, Bardon & Oliver No. 9.
 200 other machines.

Immediate Delivery:

6-C Bliss Double Crank Press, tiered construction. Stroke 8".
 Diameter of crankshaft 6" & 7".
 Area of bolster F. to B. & R. to L. 34" x 60".
 Die space with stroke down from bed 20".
 Motor drive with motor.
 Weight 39,000 lbs.
 Price on application.

INTERNATIONAL MACHINERY3131 E. JEFFERSON
DETROIT, MICHIGAN

WANTED

TAPS — TWIST DRILLS — FILES — CUTTERS
ENDMILLS — SAWS — HACK SAW BLADES

WE WILL BUY YOUR SURPLUS TOOLS

WESTERN TOOL EXCHANGE

18 N. Halsted Street Chicago, Illinois
SURPLUS BOUGHT AND SOLD

CHAIN HOISTS

BOUGHT • SOLD • SERVICED

Your inquiry will be appreciated
and given prompt attention.

T. V. LOGEMAN
NORMANDY (St. Louis Co.) MO.
ROsedale 2304 - Yorktown 0991

FOR SALE — GOOD TOOLS

Press, No. 15 Robinson Horning, M. D., 1 H. P., Mtr., 14 ton cap., adjustabletbl.	\$225.
Friction Saw, Ryerson No. 3 1/2 with 75 h. p. motor, 52" diam. blade.....	\$2,000.
Saw, 8" x 8" Atkins, m. d. 1 h. p. mtr.	\$100.
Shear, Berstch, 17" x No. 10 ga., b. d.	\$3,000.
No. 2 B. & S., Auto., oversized spindle, 1 1/2" cap. Serial 14520.	\$1500
No. 2 B. & S., Auto., oversized spindle, 1 1/2" cap., Serial 5009.	\$1800.
No. 6 B. & S., auto., b. b. spdl. 2 1/2" cap.	\$3,500.
Cleveland Automatic, 4 1/2", Model A, ser. 25446	\$1,250.

BANSBACH MACHINERY CORP.
3845 West Madison Street, Chicago

Have You Taken Advantage Of This Bargain? Hundreds Of These Vises Have Been Sold Already—Going Fast.

New drop forged heavy duty steel VISES.
 3" Swivel \$5.50; 4 1/2" Swivel \$7.75; 4 1/4" Stationary \$6.75; 5" Swivel \$8.50; 5" Stationary \$7.50.

These vises were manufactured by the Canal Fulton Drop Forge Company, now out of business. Buy your vises now—before they are all gone. Write for literature.

The Elyria Belting & Machinery Co.
 Elyria, Ohio

"BURNS BEST BARGAINS"

AUTOMATICS

B. & S. OG H.S. min-b., new New Brit. No. 634—6-sp. chuk. M.D. New Britain No. 33 New Britain No. 24 chuk. tap, at. Gridley 4-sp. 9/16", model G. Gridley 4-sp. model F. 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ", 1 $\frac{1}{2}$ ". Gridley single spdl. 2-1 $\frac{1}{2}$ " & 4-1 $\frac{1}{2}$ " Cleveland 4 $\frac{1}{2}$ " model B. 2 $\frac{1}{2}$ " model A. 5-hole (4) Acme No. 52, No. 53—4-spdl.

BORING MACHINES

Barrett horiz. bar 3-1 $\frac{1}{2}$ " Barnes No. 1 horiz. dbl. sp. box & drill. Moline No. 5 hole hog 6-sp. S.P.D. Niles 4-7/16" sp. diam.

DRILLS

Hausch No. 4 multi., 28-sp. B.D. Hausch 20-sp. rect. hd. M.D. 10 H.P. Nato No. 11, 12-sp. P.F. No. 1 taper B.D. Nato 8-sp. rd. hd. No. 1 taper Baker No. 217 heavy duty (2 $\frac{1}{2}$) Celborn No. 5 comp. ta. S.P.D. Allen horiz. P.F. on each sp. M.D. (2) Sundstrand, horiz. cent. & drill.

GEAR HOBBERS

Fellows No. 6, No. 65 Barber-Colman No. 12 Schlu. & Sel. No. 1, cap. 28" diam. x 12 $\frac{1}{2}$ " face

GRINDERS

Heald 72A-3 Sizematic internal M.D., (3) motors Bryant No. 10, No. 12 chucking Van N. No. 3-1 $\frac{1}{2}$ Au. int. H., B.B. LeBlond No. 1 Tool & Cutter

HAMMERS

Erie Steam 800 lbs, 1000 lbs, 1500 lbs. Mayer 100 lb. trip Niagara 200 lb. board drop

"SPECIAL"

Heald 72A-3 Sizematic Internal Grinder, motor drive (3) AC motors

PRESSES

Cons. No. 53 Trim. Side Shear, F. W. T. M. D. Niag. 8.8. grl. str. 8" frie. el. Bliss: No. 3-4-B Toggle single grl. str. 8" Zeh & Hahnenmann No. 8-1 power percussion str. 8-1 $\frac{1}{2}$ "

PLANERS

Diet. & H. o.s. 36x18x8" M.D. Gray 24x25x6, one hd. Woodward & Powell 30x30x8

TURRET LATHES

Foster No. 1-B Univ. grd. hd. M.D. bar & chuck equip. Steinle 24" grd. hd. M.D. 6-1" hole in ap. Gisholt No. 4 Univ. grd. hd. M.D. Gisholt 30" simplimatic B. & S. No. 6 hd. P.F. M.D. Brown & S. No. 6, No. 2 B.B. Foster No. 4, No. 6 Warner & Sw. No. 7 frie. Ind. W. & S. No. 1, No. 2, No. 3 unis. No. 4, No. 6 B. & S. Oliver & Oliver, No. 2, No. 3 Gisholt No. 2 wire-feed

MISCELLANEOUS

Keller E-4 Autom. Profil. Mach. for die sinking. Garvin Die Slotted Ingersoll, 24x24x10" Mill. (2) side hds. (1) hd. on rail. M.D. Garvin No. 12 hand Miller P.F. Rock River No. 10 horiz. bend. & str. machine all steel frame, M.D. Blum No. 119 thread roller Consol. No. 3 dbl. seam. mach. Wells, cap. 3", 4", wire strtrs. Niagara, 5" power Squar. Shear, cap. 10-ga. E & K 8" power Squar. Shr., cap. 16-ga. Pexto No. 162-5' power, Squar. Shear, cap. 16-ga. m.d. P. & W. No. 4 vert. Die Sinking equip. with cherrying att.

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For cutting odd shapes cut of sheets and plates

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Bending

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Open Side

PLANERS

Plate Edge

Rotary—Column Facing Machine

We shall appreciate receiving your inquiries for equipment of the type we handle as represented herein. Complete details including cuts will be furnished promptly in response to your inquiries covering any machines we may have in accordance with your requirements.

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Embossing & Coining

Gap Frame

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Screw

Straight Side Single Acting

Toggle Drawing

Trimming

PRESSES—HYDRAULIC

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Forming

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For slitting strips from metal sheets, iron, steel or non-ferrous

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- 1-2 $\frac{1}{4}$ " Model "F" Gridley 4-spindle.
- 4-2 $\frac{1}{2}$ " Model "A" Cleveland single spdl.
- 4-1 $\frac{1}{4}$ " Model "F" Gridley 4-spindle.
- 1-1 $\frac{1}{2}$ " Model "M" Cleveland 4-spindle.
- 2-1 $\frac{1}{4}$ " Model "G" Gridley 4-spindle.
- 3-No. 3 New Britain 6-spindle—these can be arranged for either bar work or chucking work.
- 1- $\frac{7}{8}$ " Model "M" Cleveland 4-spindle.
- 2- $\frac{7}{8}$ " Cone 4-spindle Automatics.
- 3- $\frac{7}{8}$ " Model "A" Cleveland sgl. spdl.
- 2- $\frac{7}{8}$ " Model "G" Gridley 4-spindle.
- 2-6 $\frac{1}{2}$ " Goss & DeLeeuw 4-spindle Chucking Machine, m. d.

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- Universal No. 3A, 3 $\frac{1}{2}$ bar.
- N. B. P. 4 $\frac{1}{2}$ " bar horiz.
- Landis No. 35, 3 $\frac{1}{2}$ " bar, horiz.
- Bullard 24", 36" N. E. vertical.
- Gisholt 42" vertical 2 heads.
- N.B.P. 44", 2 hds. vertical.
- N. B. P. 72" Vert. 2 heads.
- Colburn 72" 2 hds. vertical.
- Bullard 8" Multi-Automatic; 6 sp.

LATHES

- Amer 42" \times 35" Engine Lathe.
- American 24" \times 12" geared head.
- Putnam 36" \times 28" g.h., nearly new.
- Lodge & Shipley 24" \times 12" cone.
- Le Blond 25" \times 16" cone.
- Hendey 14" to 24" \times 6" to 12".
- Lo Swing 8x60", latest type.
- 200 other lathes—all sizes.

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- Liberty 44x42x18"; 4 heads.
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- American 36" \times 36" \times 20"; 3 heads.
- W. & P. 60" \times 42" \times 19"; 4 heads.
- Niles 60" \times 60" \times 12"; 2 heads.
- Niles 72" \times 72x14"; 2 heads.

DRILL PRESSES

- Natco Nos. 12, 13 & 22 mult. sp.
- Natco C11 drill, mechanical fds.
- Natco C13H drill, hyd. feeds.
- Pratt & W. No. 12 rect. head.

DRILL PRESSES—RADIAL

- American 4", Pl. Triple Purp.
- Cinc. Bick. 3 $\frac{1}{2}$ ", 4", 5" 6" plain.
- Reed Prentiss 3" plain.
- Bausch 6" plain.
- Western 6" plain.
- American 6" univ.

GRINDERS

- Pratt & Whitney No. 14 surface.
- Heald No. 20, No. 22.
- Heald Nos. 55, 60, 65, 70 inter.
- Heald No. 25 rotary surface.
- Norton 10x36, 14x72 plain.
- Norton 10x36, 14x72 plain.
- Landis 6x18, 10x24, 12x36 pl.
- Landis 6x32, 16x48 crankshaft.
- Norton type B-81, 14x30-36".
- B. & S. No. 1, No. 3 univ.
- B. & S. No. 30 Worm Grinder.

MILLING MACHINES

- Milwaukee No. 1B Univ. dble. overarm.

B. & S. Nos. 2A & 3A univ.

- B. & S. Nos. 2B, 3B, plain.
- Hanson & Whitney Thread.
- Lees-Bradner No. 8 Thread.
- Cincinnati 18", 24", 48" auto.
- Ingermann 24x24x12". 36x36x12".
- 3 hd. adj. rail.

TURRET LATHES

- Foster No. 1B.
- Gisholt 24", 6 $\frac{1}{2}$ " hole.
- W. & S. Nos. 2, 4, 6.
- Foster Nos. 2, 4.

GEAR CUTTING EQUIPT.

- Barber C. Nos. 3, 12 g. hobbers.
- Gould & E. 18H, 36H.
- Cleveland 8 spindle spline hob.
- Gleason 10", 15" spiral bevel.
- Gleason 24", bevel gear.
- Fellows No. 8B burnisher.
- Fellows Nos. 6, 61, 515, 7, 71, 7A.
- Lees Bradner lapper, cap. 1 $\frac{1}{4}$ x8"

MISCELLANEOUS

- Nazel No. 8 Hammer.
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- Ohio 36" Super-Dreadnaught Shaper.

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- No. 93A Toledo D.C., geared.
- No. 92B Toledo D.C. geared.
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- S51 Ferracute D.C., flywheel.
- No. 50-4-36 Minster S.S. D.C.
- No. 35 Toledo Stiles, geared.
- No. 33 Swaine O.B.I.
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- No. 6 Waterbury-Farrel D.C.
- No. 5 Bliss Stiles.
- No. 2 Verdin, Kappes & Verdin O.B.I.
- P2 Ferracute Stiles.
- DD2, D2 Ferracute Drawing.
- No. 2S Consolidated O.B.I.
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- Waterbury-Farrel Single Action O.B.

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- No. 6 Becker Vertical, cone.
- No. 22 Garvin Vertical, s.p.d.
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- No. 2 Van Norman Duplex.
- No. 2 Cincinnati Plain, cone.
- No. 3 Hendey-Norton Plain, cone.
- No. 3 Kempsmith Plain, cone.
- No. 4 Cincinnati Plain, cone.
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- 24" Cinc. Du. Auto., m.d., Nat. Std.
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- 24" Cincinnati Plain Automatic, m.d.
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- 6x48", 6x80" Pratt & Whit. Thrd. Mill.

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- 10" Alba, gear box, new.
- 15" Potter & Johnston Univ., gear box.
- 16" Steptoe, gear box.
- 18" Springfield, gear box.
- 18" Springfield, D.C. drive.
- 20" Cincinnati, cone.
- 20" Queen City, cone.
- 20" Smith & Mills, cone.
- 24" Barker, cone.
- 24" Gould & Eberhardt, gear box.
- 24" Potter & Johnston Univ. gear box.
- 24" Rockford, cone.
- 32" Cincinnati, cone.

KEYSEATERS

- No. 2 Baker, m.d. No. 2 Baker, belt.
- No. 2 M. & M., belt 1" Morton, belt.

ROLLS

- 24" Niles, shipyard type, pyramid type, cap. 1" plate. Wt. 154,000 lbs.

**4' American Universal Radial Drill, Motor-on-arm
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29" Cleveland, Model C

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4 sp. Barnes Camel Back self oil.
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4 spindle Leland-Gifford, p.f.

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No. 24 LaSalle
No. 24 Standard 12" x 36"
No. 27 Gardner motor driven
Disc Nos. 4 & 6 Gardner, B. B.
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No. 3 Wilmarth & Norman surf.
No. 2 Reid
No. 210 Heald Rot. Surf., 8wick.

Hack Saws

6" x 6" Peerless, Univ. Shap., M.D.
6" x 6" & 9" x 9" Peerless, M.D.

Lathe

20x8 LeBlond, u.c.g.
14x16" 1sp. Head
14" x 6" Lodge & Shipley
14" x 6" & 16" x 6" Bradford
14" x 6" American, Grd. Hd. M.D.
14" x 8" & 20" x 8" American
20" x 9" & 28" x 11" Hamilton
20" x 10" & 24" x 12" Schumacher
42" x 16" Schumacher

Milling Machines

Kempsmith No. 2 Plain
No. 2 Cincinnati
Duplex No. 3½ Pratt & Whitney
Pl. No. 1 K.L.; No. 1A Val. City
Universal No. 1 & No. 2A B. &
S. Nos. 2 Kempsmith
No. 2B Brown & S. Pl., M.D.
Vertical No. 4-B Becker

Nibblers

Nos. 1, 1B & 2 Campbell

Presses

No. 55 Cleveland 180 ton cap.
Cam Drawing, No. 1 Bliss, b.g.
O.B.I. Nos. 1, 21, 3½ & 5A Tol.;
No. 16 Stoll, M.D.; Nos. 4 & 5
Bliss, B.G.; No. 4 Verson, M.D.
Toggle, No. 3½ Bliss
No. 4 & 5½ Walsh
No. 102 Consolidated dble. crank

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20" x 30" x 6" Columbia
30" x 30" x 6" D. & H., openside

Shears

16" & 21" Milwaukee, B.G.
16" & 20" G. & E., B.G.
20" Rockford, hi-ser., M.D.
24" Stockbridge, M.D.

Screws

No. 316-B Niagara, circle
Cleveland Single End Punch
No. 53 Beloit comb. pch. & shear
Screw Machines
No. 4 W. & S. gd. head, m.d.
No. 0 B. & S. M. D. Hand
Nos. 0 & 1 Foster, Hand
No. 2 B. & S. Hand with collets

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Arc: 200 amp. IFSL; 400 A. I.
Spot: 20 KW Taylor; 12 K.W.
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2½" Landis Bolt Cutter
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Keyseater, No. 2 Mitts & Merrill
No. 2 Davis Keyseater
No. 2 Ryerson Friction Saw, M.D.

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TOLEDO PUNCH PRESS—No. 93C

FERRACUTE PUNCH PRESS—SG75

FELLOWS GEAR SHAPER—No. 7A

GOULD & EBERHARDT CRANK SHAPER, 24", M.D.

CINCINNATI UPRIGHT DRILLS—24", late type

EDLUND HIGH SPEED DRILL—6 spindle

AVEY DRILL PRESSES, 2, 3, and 4 spindle

FOSDICK DRILL PRESSES, 2 spindle

GRAY PLANERS, 84" x 12" and 14"—Spur Gear

SPRAGUE DYNAMOMETER—75-150 HP

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- $\frac{7}{8}$ " Cleveland Model M, 4 spd. m.d.
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- 6-spd. Allen, with power feed to each spdl.
- 5' Carleton, Radial, motor drive.
- 4 spdle. Leland G & Allen 12" overhang.
- No. 1 P.W. 2 spdle. horiz. deep hole, m.d.
- Fox, Naton & Bausch Mult. Spdle. m.d. & m. (8).
- No. 121, 217, 310 and 314 Baker (8).
- 21" & 24" Cin. Bick. (16), direct m.d.
- 3" American Hi Sp. Radial, motor on arm.
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- Moline Hole Hoq, various sizes (5).

Gear Equipment

- No. 16 Hi-sp. Gould & E. Gr. Hobber, spd.
- No. 18H Gould & Eberhardt Hobber.
- No. 36 S.T.G.E. Auto., 4 spdle. Gr. R., m.d.

No. 12 F. & H. Boring Mill, floor type, 7" dia. quill, m.d. 5 $\frac{3}{4}$ " dia. spdle, nose. Model "ID" Cleveland Single End Punch, m.d. 36" throat, Flanged ram. Latest type.

Grinders

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- No. 126 Gardner, dble. spin. op. m.d. type, Hyd. Feed.
- No. 11, 12 & 14 B & S Cyl. (8).
- 53" Besley vert. disc. m.d. & M.
- Nos. 6, 12A & 20 Bryant Int. Chuck (12).
- 12" and 16"x36" Cinc. Pl. Cyl. (2).
- Heald Internal Nos. 60, 70, 72, 75 (8).
- No. 11/2 Cinci. Tool & Cutter Grinder.
- Rivet Internal Grinder.

Lathes

- American, 20"x10", Geared Head.
- Fay Automatics 14" standard (7).
- Gisholt Simplimatics (2) m.d.
- 16"x6" Hendey Geared Head, t.a.
- 18"x8" Hendey, TA, DR & Collets, BMD.
- 24"x12" American Grd. Hd. 28"x8" 6".
- 31"x10" Wickes c/s., ecc'lic hds., all m.d. & m.
- 24"x10" Lodge & S. Crankshaft, m.d. & m. (2).
- Nos. 5A, 6A, 8C P. & J. Auto. m.d. & m. (12).
- P. & J. Auto. Unimatic, m.d. & m. (2).

Mills

- Mill No. 11 $\frac{1}{2}$ Br. & Sharpe, Plain.
- Mill No. 11 $\frac{1}{2}$ " Le Blond, Plain.
- Mill No. 3 Kempsmith, Plain.
- Cinc., Vert., No. 4, rapid trav., late type.

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BRAKES—D. & K. 5' Box & Pan, 14 ga. D. & K. 10' 10 ga. Leaf type Power & Keene 10' 16 ga. Togress Press.

DRILLS (RADIAL)—Mueller 2½', Fosdick 2½', Prent. 3'; Carlton 4' oil gear box dr.; Hammond 4' sensitive; Amer. 2½' M.D. gear box. Mueller 4½' q.box.

DRILLS (H. S. B. D.)—H & W 2, 4, 5sp.; Allen 2 & 6-sp.; Avey, Demco, Lel-Giff. 1-sp.; Avey 2-sp.; Aveymatic 2-sp., m.d.

DRILLS (MISC.)—Baker No. 217 (2) & No. 314 Hwy. Duty; Hamilton 42" S.H.; Barnes 20" & 24" 1-sp. & 20" 4-sp. & 24" 3-sp. all grd. camel back; P & W No. 12 Multi-Sp.; Nitco 20-sp. Rect. head.

GEAR CUTTERS—G & E 60" & B & S 26" s. p. d. automatic spur; Fellows 24" gear shaper. Cincinnati 36" gear cutter.

GRINDERS—P & W 12" vert. surf.; Cin. No. 1½ & B & S No. 12 univ. tool. B & S Nos. 11&16 pl. Heald Nos. 60&65 Int.; Landis 10x30" Plain; B & S 10x48"; 3—Norton 6x32" plain, Heald No. 20 Rotary Surface (3); B & S No. 2 Univ.; Badger No. 220, auto. d. e., opposed disc (4); Walker 8" Rot. Surf.; Modern No. 5 Int. Brown & Sharpe No. 2 Surf.; B & S. No. 10 pl. self-cont. Norton 10"x36".

KEYSEATERS—Mitts & Merrill No. 5 vert. Davis No. 1; M&M. No. 0; Catlin No. 2.

LATHES—Monarch 16"x10" M.D.; LeBlond 18x8"; Lehmann 18"x9"; Amer. 22x8"; Davis 22"x10"; L & S 20"x10"; S-B & E 20"x10" q. c. q.; Flather 22"x10"; Bradford 21"x10"; LeBlond 16"x8"; P & W 17"x10"; Gleason 45"x12"; Johnson 36"x24"; Monarch 16"x8" (2). Hendey 14"x6" & 16" x 8".

MILLING MACHINES—Ohio No. 29 Univ.; Kemp. No. 3; Brown & Sharpe No. 3; Cleveland No. 1 single pulley dr., univ.; Amer. No. 1½"; Cin. No. 3; B & S No. 3; Hendey No. 3; LeBlond No. 3; Mill. No. 3-B & Cinc. No. 3 s. p. d. pl.; Becker Model "B" & No. 6 vert.; Kemp. No. 33 spd. Prod.; Ingersoll slab, M.D. 33", table 30½"x16"; LeBlond No. 4 m. d. pl. Cin., No. 1½ Univ. M.D.; Cin. No. 4 pl. High Power; Cin. 12" Mfg. & 24" Auto. Clevel. No. 2 S.P.D., Pl. B&S. No. 0 pl.

PLANERS — Gray 30"x30"x10' 2 heads; Gray 48"x48"x10'; Gray 28"x28"x6' 1-hd.; Pond 32"x34"x10'; Hamilton 60"x36"x10', 2 heads.

PUNCH PRESSES—Federal Nos. 1, 2, 3 o.b.i.; Bliss No. 62 geared; Bliss No. 18 & 19; Ferracite No. P-4; Toledo No. 52 arch; Fer. No. EGF 52 Coining; Willard No. 4A o.b.i.; Swaine No. 38 arch, geared; Swaine No. 37 o.b.i.; Bliss No. 83 Reducing; Rock. Nos. 2 & 3; & Verson No. 4 o.b.i.

SAWS (HACK)—Rac. 6x6" h.s.; Rac. 8x8; Peerless 6x6" H.S. (4); Peerless 6x6" M.D. Univ. Shaping (2); Peerless 13x16".

SHAPERS—S & M, G & E, Ohio, Mi., Q. City, Davis, Cin. 16"; Ohio & G & E 20"; S & M, Q. City, Rock, 24"; Ohio 26"; Cin. 24" s. p. gr. box; Rhodes 3½" Vertical; American 24" heavy, b.g. Amer. 15"; Springfield 15"; S.M. 26"; b.g.

SCREW MACHINES—W&S. Nos. 4, 6, 6 8 Hand; Nat. Acme. Nos. 515, 52, 55, 4-sp.; Gridley 4-sp. 7½"; Automatic, B. & S. No. 00 Auto.; Grid. 4-sp., 2½".

SLOTTER—Bement-Miles 10" vert.

SQUARE SHEARS—D & K 52" 14 GA. Power; Tol. 72", 14 ga.; Stoll 42", 14 ga. Niagara and Pexto 6", 10 ga. Power.

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- H. im controls, m. d.

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- No. 2 Wat. F. d. s. d.
- No. 3 Manville, d. s. d.
- No. 3½" Waterbury F. d. s. s. d.
- No. 22 Waterbury F. d. s. s. d.

LATHES

- 12" x 6" Hendey yoke head, t. a.
- 14" x 5" American geared head, t. a.
- 14" x 6" American geared head, t. a.
- 16" x 6" Monroe helical geared.
- 16" x 6" Hendey geared head, t. a.
- 16" x 10" Prent or, geared head, t. a.
- 30" x 11" American.
- 20" x 11" American, taper att.
- 27" x 16" L. & S. sel. grd. tap. att.
- 28" x 48" x 16" Mc'Abbiele spidle.
- 26" x 48" x 24" McCabe dble. spidle.

MILLERS

- 6" x 14" Pratt & W. g. h. thread.
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- 6" x 80" Pratt & Whitney, thread.
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- No. 1Y Brown & Sharpe plain.

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- No. 3B Brown & Sharpe plain.
- No. 4 Brown & Sharpe plain.
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- No. 2 Brown & S. vertical.
- No. 6 Be ker vertical, m. d.
- No. 5 Brown & Sharpe vertical.
- No. 2 Brown & Sharpe universal.
- No. 2A Brown & S. univ., m. d.
- No. 3 Brown & Sharpe Univ.
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- 1⅓" New Britain Auto., m. d.
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- Several 2½" x 24 J. & L. steel head
- 3" x 36" J. & L. steel head.
- 24" L. bby.

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12" Niles Cyl. Boring Mach. D. S.
8x8 Niles Vert. 2 heads, M. D.
42" N.B.P. s.p.d.; 42" Gisholt Vt.
52" Bullard, 52" Bausch
P & H. Horiz. Boring Bar, 7"
No. 2 Rock. Horiz. 3" bar

BRAKES

Hand: Chicago Steel 10'14"; 3'16";
4'12"; 8'18"; 8'16"; 8'10"; 10'16"
Box & Pan: Chgo. St. 4'; 5'; 6';
8'14" ga.; 4'10"; 6'10"
BRAKES: POWER

Chgo. Steel; 12'3"16"; 8'1"; 10'
3"; 12'1"; 8'10"; 8'12"; 6'10";
6'12"; 3'3"16"

DRILL PRESSES

17" Canedy-Otto, vertical, M.D.
Leland Giffords, 1 to 4 spdl.
6 spdl. Elllund, P. F. No. 2B Ed.
No. 2 Bausch Mul., 22 spdl.
Allen High Speed, 1, 2 and 3 spdl.
5 spindle Detroit Horiz. Auto.
No. 3 Avery High spdl. B.B., M.D.

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32", 36", 48"
GRINDERS

16x66 Landis, No. 12 B.S.
84" diam. face, m.d.
Springf. Pl. Type Table 24x50"
No. 4 Gallmeyer & L., M.D.
No. 2 B.&S.; No. 3 Abrasiv.; 8"
Arter rot. No. 33 Abrasive.
No. 3 Diam.; 12x48 m.d.

LATHES

Hardinge, Precision, 1" cap.
36"x20" New Haven
9'x31"; 16"x8" P. & W., Q. C. G.
24"x15" Reed P. Grd. Hd T.A.
36x30" L&S. 24" cent. cog; 48"
18"; 24" McCabe Dbl. Spindle;
14"x6"; 18"x8" Monarch
64"x25" Bement; 38"x20" Har-
rington; Sundstrand 8" Stub

LATHES: Spinning

Prybil 22"; 24"; 26"; 28"
LATHES: Turret

No. 4 & No. 6 W. & S. cone; No.
3 Foster, g.h.; No. 4 W. & S.
No. 9 Barlons & O. No 8 Foster
PLANERS

26x8" Cleve. Openst.; 48"x48x8"
12" Belmar, 4" id.
36x12 Openst. Dietrich & H.
20" Niles Plate Planer

MILLERS

No. 21 Brown & Sharpe Plain
48" Inc. Auto. No. 25 Ohio U.
No. 1Y B.S. Horiz.; No. 3 B.S.
No. 2, 3, 4B, 5B Becken Ver-
Thrust Mill, 6x48" P. & W. m.d.
Ingersoll. Planer Type—36"x168";
48"x22"—hds. 40 HP. Mtr.

PRESSES: OBI

No. 5 & No. 6 Toledo (3); No.
5 Cons.; No. 6 Hamilton 6" str.
No. 20 Bliss; No. 40 Perkins
No. 4 Nia.; No 3 Toledo; No. 5
Bliss Horizontal, 8" str.
No. 3 Niagara (5); No. 2 Rockford.
No. 4 L & J; No. 75B Toledo

PRESSES: Double Crank

No. 9-6 Toledo, 14" bevel uppr.
24" str. tie-rod, wt. 162,000 lbs.
No. 17 Bliss, Gap Fr.; 8" str.
No. 24-E Bliss 60" between columns
No. 8-A Bliss; No. 68B Nia. air
cushions, No. 93-B Nia. air
cushions, No. 138A Stoll, 38" bet. uprights
No. 1D Bliss, 4" stroke

PUNCHES: Multiple Gang

No. 6 Nia.; W. & W. No. 35.
No. 30A, No. 32

PRESSES: Horn

Toledo No. 14, No. 42, 43-P
Nia. No. 15, No. 116; Bliss No. 39.
No. 21, No. 40

PRESSES: Deep Throat

Toledo No. 17, 20" thr.; No. 15

EXCEPTIONAL TOOLS GRINDERS

No. 2 Cin. Centerless
14" P & W. vert. Model B
No. 16 Blanch., sur., 36" ch.
No. 26 Landis Cyl. 24"x144"

LATHES: Turret

No. 3L Gisholt, hardened ways,
m.d.

LATHES

30" Pit Lathe, 156" face plate
18"x10" L&S, gd. hd., m.d.

JIG BORER

No. 2 Pratt & Whitney, M.D.

VERTICAL MILLS

No. 4 B. K. & T. Timken Bear-
ing; No. 2½ K. & T. SP.D.

MILLS—BORING

42" Bullard New Era
24" Bullard Rap. Prod.

PRESSES: Straight Side

No. 66 Cons. S. str.; No. 55 C.
No. 57 Toledo, 8" str. No. 59 T.
No. 1 Walsh, 8" str. g. 3½" stroke
No. 74W Bliss Wedge type
No. 832 Verson All Steel 250 ton,
12" str. Marquette air cushion,
bed 5x32

PRESSES: Toggle

Bliss No. 3½ & 3½A; No. 1½, No.
3, No. 5-8
No. 408B Bliss, 84" bet. up.
No. 409 Bliss, 108" bet. up.

PRESSES: Coining

No. 664 Tol. 600 ton, No. 27K
Bliss 1000 ton—2½" str. W. F.

PRESSES: Hydraulic

Woods, 150 ton, 49" bet. han
200 ton Watson-S. 2-19" ram
38"x62" between columns
400 ton Southwark, 30" dia. ram
42"x54" between columns
1000 ton Birdsboro, triple ra-
platens 10" x 12"

PRESSES: Stiles or Solid Back

Ferracute, P2, P3, P4, P6
Bliss No. 4, No. 83, No. 4N, 5
Toledo No. 34P, No. 36

PRESSES BRAKES

Verson All Steel, 60" x 14" ga. ca
10' 10" ga. Cin. 12" on die
10' 3" 16" Chgo. Steel 12" on d
10' 2" Rafter

RADIAL DRILLS

6" Am., 5" Fosd.; 3" Cin. Bi-
ford; 4" Fosd.; 3' Am. Trip
Purn.; 4" N.B.P. 4" Hammer

RIVETING HAMMERS

No 2A, 3A, 5A & 5½ B.H.

ROLLS: Bending

8' 1" Beloit; 6' Beloit
8x11" Niles Tyr. drop end

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7-Spindle, Adjustable, M.D.

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48" 17 rolls, M.D.; 38" Hillsides
54" McKay 17 rolls, M.D.

SAWS

No. 0, 1 & 2 Ryerson Fric
Hack Saws; 13x16" Peerless; 6'
6" 9x9" Peerless Shaping Bar
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Hydraulic Scrap Baler 150 lb. bales, Galland & Henning.

66" x 16" x 24"

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20" Queen City; 16", 24" 28
and 32" G. & E.; 20" G & E.
24" American SPD thru gear box
24" Bement Slotter

SCHEARS: Power and Foot

10'18ga. Nia. 6'10" ga. Rob.;
Bertsch 10'3" 16"; 13" 1" United
10'3" 16" Chgo. Steel, M.D.;

10' 10ga. Rob.; 10' 4" Nia. 18" ga.
10' 8" United Eng.; 5" 8" Toledo
12" 14 ga. Streine; 12" 10" ga.
42" 18" ga. Niagara; No. 1½ &
K. Mitt. Alligator Rota-
Quickw., 60" thr. 14" ga. Quiet
work No. 25, cap. 7½";

Threadless 10" 14" & 36", 90"
Foot Shears, 20", 30", 36", 90"

MISCELLANEOUS

Air Compressor 10'10" 14x12
Column facer, 48" Newton, M.D.

Filing Mch., No. 3 Thiel, M.D. (2)
Furnace, Elec., James Fisher (2)
Gear Hobber, No. 16 H. Geer

Davis Gas Acetyl. Gen., 300-lb. (2)
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Chicago Press Brake, 8 x 18".

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Radial, 3 ft. Fodick.
Nato Type K 20-spdl.
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Prentice, 4-spindle.
Allen BB 2-spindle.
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Demco DAH BB, MD.
36" Cincinnati BG PF SL.
25" Hickford, G. & E.; Slid. Hd., P. F.
20" & 24" Prentice BG.

GRINDERS:

Disc. No. 6-20 Besly.
Disc. No. 220 Badger & press.
Disc. No. 41; Besly 20".
Drill, New Yankee, D. E.
Internal, Madison; No. 65 Head.
Surface, No. 210 Head 8".

HAMMERS:

50-lb. Little Giant MD.
40-lb. Bradley Helve.

LATHES:

26" x 12" Putnam Pacific type, DBC,
Semi-QCG, T. A. 26" Chuck.
18" x 8" Raha & Mayer.
18" x 8" Lodge & Shipley MD.
14" x 6" Lodge & Shipley.

LATHES—Turret:

16" Type A Gisholt, 6 1/4" hole.
21" Type H Gisholt, 3 3/8" hole.
24" Type I Gisholt, 4 1/8" hole.
24" Type II Gisholt, 4 1/8" hole.

MILLERS:

No. 1-B Kearney & Trecker Plain.
No. 2 LeBlond, plain, M. D.
Nos. 2 & 3 Kempsmith, plain.
No. 25 Becker-Brainard.
No. 3B Owen, DH, Vert. att.
Pratt & Whitney, 2" spline.

PRESSES:

Hydraulic, 42-ton Elmes.
OBI, No. 0, 4 1/2 Loshbough-Jordan.
O. B. I., No. 30 Swaine.
Foot Press, No. 4 Swaine.
Str. Side D-44 Pexto.

PUNCHES & SHEARS:

Queen City DE, 1/2 in 1/2", M. D.
Rock River L, 1/2 in 1/2", 24 thr.
Cleveland C, SE, 1/4 in 1/4", 26" thr.
No. L-10 Badger, DE, 1/2 in 1/2".
No. 14 1/2 W-W, 25" thr.: m. d.
No. 54 Beloit S. E., 1/4" in 1/4".

SEARNS:

Jig, GEM, 18 ga. cap., M.D.
Rotary Bevel, Lennox 1/4".
Square, Stark 9"; 18 ga. cap.

THREADERS, Pipe & Bolt:

Murchey, 1/4" dbl. head, bolt.
Pipe, 2" Oster M. D.

MISCELLANEOUS:

Bender, No. 15 Wallace.
Dbl. Seammers, Swain.
Compressor, H-B CCB, 14x9x8,
20 HP motor.
Groover, 30" x 30" x 8" Pease and
Wheeler.
Metal Band Saw, 14" Racine.
Rolls, 10' Pyramid 1/2" cap.
Saw, cold, No. 2-B Cochr.-Bly.
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- 20"x8" American, 3 S.C.D. D.B.G.
- 20"x16" American, 3 S.C.D. D.B.G.
- 27"x12" American 8 spd. Grd. Hd.
- 2-18"x8" Lodge & Shipley Grd. Hd. M.D.
- 2-20"x8" Lodge & Shipley Grd. Hd. M.D.
- 30"x20" Amer. 12 speed Grd. Hd. S.P.D.
- 36"x22" Lodge & S. Sel. Hd. S.P.D. Taper.
- 36"x22" Putman Geared Hd. S.P.D. Taper.

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- 30"x30"x16" Gray Planer.
- 26" Whipp Openside Crank Planer, S.P.D.

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- No. 3 Cincinnati H. P. Univ., 3 S.C.D., D.B.G.
- No. 4 Cincinnati Hi.P. Cone 3 S.C.D., D.B.G.
- No. 4 Cinc. H.P. Cone Univ. 3 S.C.D., D.B.G.
- No. 2 Cincinnati Plain Cone.
- No. 2 Kempsmith Cone, M.D.
- No. 3 Heavy Oesterlein, Cone Universal.

Grinders

- No. 33 Abrasive Surface M.D.
- No. 2 B & S Surface M.D.
- No. 1 Diamond Surface Grinder.
- No. 50, 550, 60, 65, 70 Heald Internal.
- 6"x18" Landis Plain, Self Contained.
- 10"x36" Landis Plain, S.C.
- 12"x36" Landis Plain, S.C.
- 12"x4" Modern Plain, Belt drive.
- 12" Pratt & Whitney Plain Surface Grinder.

SPECIAL

7" Diameter bar Niles Bement Pond Horizontal Floor type Boring Mill, Motor Driven.

- 36" Cinc. Openside Crank Planer, M.D.
- 16, 20, 24" G & E Shapers, cone drive.
- 32" Gould & Eberhardt, H.D., M.D.
- 16, 20, 24 and 28" Gould & E. Shapers, S.P.D.
- 20" Amer. Shaper, M. Mak. Tbl. & vise. S.P.D.
- 16" Ohio Crank Shaper, Cone drive.

Radial and Drill Presses

- 21½" Fosdick Plain S.P.D.
- 3" Fosdick, S.P.D.
- 3½", 4", 5", 6" Amer. Triple Geared S.P.D.
- 4", 6" American Triple Purpose S.P.D.
- 6" American Trip. Purpose, M.D.
- 4" Dresses Plain Radial, s.p.d.
- 21", 24" Cinc. B. Upright Geared Feeds.

Gear Cutters

- No. 1, 2, 3 Adams Farwell Gear Hobbers.
- 18H Gould & Eberhardt Gear Hobbers.
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- Gleason Spiral Bevel Generators and finishers.

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- 60" Gisholt Vertical Rapid Traverse. S.P.D.
- 7" Niles Bement Pond Horz. Plain M.D.
- 60" Niles Car Wheel Borer.

Turret Lathes

- No. 3 Cincinnati Acme, Art. M.D.
- No. 7 Foster Univ.
- No. 4 & 6 W & S Plain Cone Drive.
- 14"x19" Fay Automatic.

Miscellaneous

- Model W Cleveland Pch. & Shr. 60" thrt., M.D.
- 1" Ryerson Lennox Rotary Bevel Shear M.D.
- 8"x¾" Chicago Bending Brake.
- 6"x3/16" Chicago Bending Brake.
- 5"x10" gauge V.K.V. Press Brake.
- 10"x3/16" Sholl Power Squaring Shear M.D.
- 6"x6" Peerless Shaping Saw.
- 9"x9" Peerless H./S. Saw.
- 8"x3/16" Capt. Toledo Power Squaring Shear, Gap.

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All Steel Construction

A. C. MOTOR DRIVEN

Immediate Delivery

Inland Machinery Company
4150 Clinton St.
Chicago, Ill.

MILLING MACHINES

No. 3B B. & S. Plain—No. 4 Table—M.D.
No. 2A B. & S. Universal Motor Drive
No. 2B B. & S. Plain—Motor Drive

LATHES

Complete with Taper Attachments:
20"x8' Hendey Grd. Hd. Q.C.G. M.D.
18"x8' Hendey Q.C.G. Cone Drive
16"x8' Hendey Q.C.G. Cone Drive

GRINDERS

Complete with Magnetic Chucks:
14" P. & W. Ver. Surf. M.D. Model "B"
No. 5 Abrasive Surf. Motor in Base

SHAPERS

24" G. & E. Back Geared.
20" Rockford Single Pulley Drive
16" G. & E. Back Geared Motor Drive

TURRET LATHES

No. 3A W. & S. Motor Drive Bar Feed
No. 2A W. & S. Motor Drive Bar Feed

WE SOLICIT YOUR INQUIRIES

Clinton Machinery Company
32 S. Clinton, - Chicago, Illinois
Central 3019

MISCELLANEOUS MACHINES

16x12 Sundstrand Stub Lathe, fac. att.
11" LeBlond hvy. duty automobile lathe.
No. 1B Foster timken. spdl. univ. tur. lathe.
26" Model C Libby hvy. duty tur. 4 $\frac{1}{2}$ " bore.
26" Model C Libby hvy. duty tur. 7 $\frac{1}{2}$ " bore.
No. 2A Warner & Swasey univ. turret lathe.
No. 3A Warner & Swasey univ. turret lathe.
24" Gisholt turret lathe, 6 $\frac{1}{2}$ " bore.
52" King vert. boring mill, 2 swiv. hds.
52" Gisholt boring mill, 2 swiv. hds.
No. 5 Defiance horizontal 3" bar.
Rockford hydraulic horiz. bore, 54" tble.
No. 3XA Oilgear hydraulic broach.
Twin Ten Oilgear hydraulic broach.
2" Landis double bolt cutter.
3" Landis single bolt cutter.

C-12 Natco rect. hd. multiple drill.
No. 13 Natco rect. hd. multiple drill.
No. 14 Natco rect. hd. multiple drill.
No. 40 Natco straight line multiple drill.
No. 60 Natco 3-way multiple drill.
20" Cinci. 4-spindle gang drill.
2 $\frac{1}{2}$ " cap. Minster hvy. duty drill, reverse,
7-spindle. No. 2 Foote-Burt gang drill.
Moline 16-spindle. vert. guide hole driller.
No. 12 Barber-Coleman gear hobber, m. d.
28" Flather automatic gear cutter.
12x18" Cinci. plunge cut. grinder, m. d.
48" Newton dbl. spdl. continuous miller.
Sellers drill grinder, t. & l. pulley dr.
No. 304-A Oster pipe machine, 4" cap.
No. 7 Cochrane-Bly 15" cap. cold saw.

WE CARRY A LARGE STOCK OF USED MACHINE TOOLS.

Your inquiries will be appreciated.

The Strong, Carlisle & Hammond Company

1392 West Third Street,
CLEVELAND, OHIO

Branch 2832 East Grand Blvd.
Office: DETROIT, MICHIGAN

VICTOR'S BARGAINS IN SMALL TOOLS

CRITCHLEY TYPE EXPANSION REAMERS



Letter		Our Price Each
8-A	1/4 Expands to 9/32	\$2.00
7-A	9/32 Expands to 5/16	2.00
6-A	5/16 Expands to 11/32	2.00
5-A	11/32 Expands to 3/8	2.00
4-A	3/8 Expands to 13/32	2.00
3-A	13/32 Expands to 7/16	1.75
AA	27/64 Expands to 15/32	1.35
A	15/32 Expands to 17/32	1.35
B	17/32 Expands to 19/32	1.45
C	19/32 Expands to 21/32	1.75
D	21/32 Expands to 23/32	1.75
E	23/32 Expands to 25/32	2.25
F	25/32 Expands to 27/32	2.25
G	27/32 Expands to 15/16	2.25
H	15/16 Expands to 1 1/16	2.50
I	1 1/16 Expands to 1 3/16	2.75
J	1 3/16 Expands to 1 11/32	3.00
K	1 11/32 Expands to 1 17/32	3.50
L	1 17/32 Expands to 1 25/32	3.75
Set AA to H-27/64 to 1 1/16 — 9 Reamers.....		\$15.00
Set 8-A to L.....		37.50

Money Refunded If Not Satisfied Send for Our General Catalogue

VICTOR MACHINERY EXCHANGE, Inc.
251 Centre Street, **New York, N. Y.**

S T O P**Maintenance Tool Loss
USED STEEL TOOL CHESTS**

Made of 1/16" steel. Heavily reinforced with skids to permit easy sliding. Chests have heavy duty hasps, two handles, sliding drawer. Olive green finish.

\$750EACH
F. O. B. CHICAGOEXCELLENT
CONDITION

DEPTH 11".

WIDTH 12".

LENGTH 24".

PASSMAN BROTHERS
705 W. Washington Blvd., Chicago, Ill.

ESSLEY Machine Tools**Special Offerings**

Slightly used 6' American plain radial drill, 17" diameter column, Timken bearings, 15 h. p., a. c. motor on arm.

72"x54"x24' Pond planer, 2 rail and 2 side heads.

THE E.L. ESSLEY MACHINERY CO.
831 W. EVERGREEN AVE - CHICAGO, ILL

REASONABLY PRICED TOOLS

No. 4 KEMPSMITH UNIVERSAL MAXIMILL MOTOR DRIVE 15 H. P. 3 phase motor, Rigid Traverse—16" Index Centers.

D-31 FOX MULTIPLE DRILL, RECT. HEAD, 16"x31½" spindles centers. Bored for 36 spindles. Has ten 1½ No. 2 Taper spindles. Power feed to head.

AUTOMATICS, Several Model A Clevelands, from ¾" to 3¾" bar capacity.
BOLT CUTTER, 1¼" Acme single, class A; 2" Landis.

DIES and EQUIPMENT to make square cans, pt., qt. & gal. size.

DRILLS, 36" Cincinnati back geared, sliding head, tapping attachment.

No. 2 Colburn Manufacturing; 36" Snyder, back geared.

No. 12 Minster H. D.; 24" Barnes All Geared Self Oiling belt drive.

GRINDERS, 14"x72" Norton Plain; 12"x72" Landis M. D.; No. 78 W. & M. Surf. M. D.
LATHES, 38"x14" Fifield—Cheap; 16"x8" Sidney, double back geared, quick change; 14x6 Carroll Jamison; 18"x8" Lodge & Shipley, Geared Head.

MILLERS, No. 2B Brown & Sharpe plain, single pulley drive; No. 6 Becker Vertical with ball bearing countershaft; No. 3H LeBlond heavy duty plain.

PLANERS, 30"x30x8" Cincinnati, two heads on rail; 36"x15" Betts, 2 heads.

PRESSES, No. 1 Bliss Cam Drawing Press.

RADIAL DRILL, 3' Prentice, gear box drive; 3' Cincinnati Bickford cone drive.

SCREW MACHINES, No. 4 Warner & Swasey plain screw machine,

3—No. 1 Brown & Sharpe wire feed; No. 4 Milholland; No. 4 Foster cone head, 1½"x9"; Acme cone head; No. 5 Foster grd. head—No. 4 Warner & Swasey grd. hd.

SHAPER, 28" Kelly B. G. Single pulley drive, 10 H. P. A. C. Motor.

Many other tools—exceptional "buys"—write for full details.

A. D. White Mchy. Co., 108 N. Jefferson St., Chicago, Ill.

"The Used Machinery House Known Everywhere"
McCabe & Sheeran Machinery Corporation

No shop ever owned better Machinery

Next to the LOW PRICES the point to be emphasized is that this Equipment will give SATISFACTION to the Shops that get them

VERTICAL BORERS

18-24" swing, "Sellers" Ext. Type. 2 hds.
 72" swing, "Niles-Bement-Pond," Rap.
 Trav., 2 heads, motor-dr.
 42" sw., "Bullard" New-Era, Vert. Tur.
 Lathe
 24" sw., "Bullard" R. P. V. Tur. Lathe

LATHES

72" swing, 28' bed, "New Haven," Triple geared, with blocks to swing 90".
 42" swing, 72' bed Gun Boring Lathe, Grd. Hd., Single Pul.
 42" swing, 20' bed, "Lodge & Shipley" Qck. Ch., Triple geared.
 42" sw., 20' bed, "N. H.", Trp. Grd., B-d.
 26-48" swing, 28' bed, McCABE 2 in-1, Double Spindle; Triple geared
 OTHER ENGINE LATHES—All Sizes Driving Wheel Lathe, 90" sw., Dble Hd. Car Wheel Lathe, 42" sw., d. hd., C. d.

HORIZ.-BORERS

12" diam. bar, NILES, Cyl. Borer
 6½" diam. bar, N-B-P, "Floor-type"
 Locomotive Cylinder Borer, PUTNAM,
 Double Bar, 5" and 8" diam.

PRESSES

3000-ton, Hydraulic Forging BALDWIN-SOUTHWARK Intensifier, Accum., Pump, 200 h.p. mtr., 3/60/440
 2000-ton, Mech. Forg., FARREL BIRM.
 800-ton Hydraulic, SOUTHWARK
 (2) 500-ton Hy. Forg. UNITED Intensifier, etc.
 450-ton, Hy. Flang., R-D-WOOD

SHEARS

Vert. Hy., 500-ton, BALDWIN SOUTHWARK, 30" diam. ram; with 30" cutting blades; capacity 6" rounds.
 Flying Shear, EDWARDS, Steam for shearing bars and billets into 30' lengths as del. from Mill. Cap. up to cross section of 10" sq.

Resquar. Shear, for sheets 60" wide x 156" long; Cap. 9 g. to 30 ga. 100' per min. Consists of rotary side cut. mech.; two guil. type end shears; Scrap chopper; scrap conveyor.

Split. Shear, HILLES & J. No. 1; Blades 13" long; Cap. ½" plate; 1¼" rounds Squar. S., All St., Cap. 10'x3/16"; m-d. Squar. S. HILLES & J., 5' w.x1/4" thick

PLANERS

100"x84"x25' POND, Four Hds.; M.b.d. 72"x72"x20', Four hds.; Rev. m.d.
 72"x72"x12' POND, Four Heads; B. D. 60"x54"x20', POND, Three heads; B-D. 60"x60"x12', Cinc., Three Heads; M-d. 54"x42"x17', GRAY, Spur dr.
 48"x48"x14', N-B-P, 3 hds; B. tb.; B-d.
 ALL SIZES DOWN TO 22"x5'

CRANES

35-ton, P.&H., 38 4" sp.; 3mtrs. 220v.D.C.
 15-ton SHAW, 46' span, 5-ton Aux., 4 motors, 110 volts, D. C.
 (2) 10-ton, TOLEDO, 72' span, 3 motors, 220 volts, D. C.

OTHER EQUIPMENT

Grinder, BLANCH. No. 16, V. S., M-d
 Grinder, LANDIS, Univ., 16" sw., 48 ct
 Slotter, 24" stroke, N-B-P, Motor-dr
 Slotter, 15-18" stroke, DILL, Motor-dr
 Diesel Eng., 90 H.P., WORTH, used yr
 Flanging Machine, ½" McCABE
 Crane Scale, 20,000-lb. HOWE
 Upsetter, 1½" ACME
 Jari Roll-over & Pat. Draw. Mch., plat 60"x80"; 20" cyl., 66" x 84" rollover and drawing att.
 Hammer, 1100-lb. BEM. M. Sgl. Fr. St
 Pipe Mach., STAND. ENGR. CO., 2½" to 10" M-d.
 Friction Saw, 54" RYERS., A.C. m-d.
 OUR NEW BULLETIN NOW BEING
 PREPARED FOR THE PRESS, AND
 YOU WILL HAVE ONE OF THE
 FIRST COPIES UPON REQUEST.

McCabe & Sheeran Machinery Corporation
50 Church Street :: **New York City**

AUTOMATICS: B. & S. No. 2-G; No. 0; No. 00; Cleveland Model A; 1½".

COMPRESSORS, 500'; 260'; 156'; 90'; 68'; 42'.

DRILLS, Radial: 6' N. B. P. Univ.; 4' Bickford; 4' Cin-B; 2½"-3' Fosdick; Avery, Sipp, H&W; Allen—High Speed; B. B.; Sens. 1, 2, 3, 4 sp. GRINDERS: Internal No. 70 Heald; 14x50 Norton Pl.; 12x36 Landis Univ.

TURRET LATHES: No. 2-A Warner & S.; J & L 3x36 Chucking; J & L 2½x24 bar; Gisholt

21x3½, M.D.; No. 6 Foster Univ.

PRESSES: Bliss No. 1 Toggle; Bliss No. 306 Geared; S. S. Tierod; V. & O. No. 5 Geared; No. 2½ Bliss, Grd., O.B.I.; V. & O. No. 2½; No. 1; O. B. I.

BLISS AUTOMATIC GANG PRESS: No. 103S; makes 8 operations simultaneously; 180 finished blanks per minute. Roll Feed.

SPOT WELDERS, 10 to 90 K. W.

MOTORS—All Sizes; large stock.

KEYSEATER, Baker No. 3, 72" capacity.

FALK MACHINERY COMPANY 18 Ward Street, Rochester, New York

NEW 3 Phase B. B. Motors ½ to 25 H. P., 5 H. P. \$55.75

DRILLS

20° Lever, Wheel & Lever and Power Feed.
24° and 26° sliding head, back gear, power feed.
Bausch Multiple 16 spindle No. 1 Morse Taper.
4 spindle Foote-Burt, heavy duty.
6 spindle Hole Hog No. 1 Morse Taper, power fd.
1, 2 and 4 spindle high speed 8° overhang.
5½ Bausch Radial Drill.
59 other drills of various sizes and types.

MISCELLANEOUS

Brake, Robinson, toggle 6°.

Brakes, 6° and 10° for 16 gauge.

Grinders, cutter and cylindrical, plain and univ.

This is only a partial list of our large stock, which is constantly changing. Write for what you need.

THE OSBORNE & SEXTON MCHY. CO., Dept. H. COLUMBUS, OHIO

BRAND NEW LATHE CHUCKS—STEEL ALLOY



LAFAYETTE (MADE IN U. S. A.) UNIVERSAL GEARED SCROLL LATHE CHUCKS HEAVY DUTY, ACCURATE AND GUARANTEED AS TO QUALITY.

Size	List Price	OUR PRICE
4"	\$30.00	\$16.50
6"	62.00	22.50
8"	72.00	26.00
10"	96.00	33.50
12"	113.00	45.00

Send for our list of independent combination and universal chucks from 5" to 36".
DE WITT TOOL COMPANY, 173 Grand St., NEW YORK CITY

LATHES

54"x18' Johnson, m. d., triple geared.
36"x16' Putnam, b. d., triple grd., q. c.
28"-35"x12' Boye & E. (raised), b.d., ch.
28"x12' Boye & Emmes, belt drive, chk.
20"x8' Amer., 12' spd. grd., hd., reg. eq.
19"x8' LeBlond, belt drive, reg. equip.
15"x14' Cinc., b. d., tap. att., chuck.
16"x8' L & S, grd. hd., mtr. dr.

MISCELLANEOUS

52" King, vert. 2 hds., rap. trav., q. ch.
No. 4 Pratt & Whitney Vertical Die Sink. & Milling Mch., table 18"x72".
2" Landis Pipe Machines
14"x36" Pratt & Whitney Surf. Grinder.
18" Gould & E. Gr. Hob., cap. 30"x12"
"G" Rock River Punch 24" throat cap.
¾"x¾", motor drive

FORGE SHOPS ATTENTION —

WE ARE LIQUIDATING THE LEBANON DROP FORGE CO.

What Do You Need?

THE O'BRIEN MACHINERY Co., 113 N. Third St., PHILADELPHIA, PA.

BUY WITH CONFIDENCE

BORING MACHINES

No. 1 Cleveland, 2½" bar.
 No. 1 Blomquist-Eck, 3¼" bar, s.p.d.
 No. 2 Coffman, 3¾" bar, motor drive.
 No. 2 Barrett, 5" bar, extension bed.
 5" Bar Niles-Bement-Pond, Fl. Type.

BORING MILLS

24" Bullard, "New Era."
 30", 36" King.
 36" Bullard "New Era" (2).
 42" Gisholt, motor drive.
 42" King, motor drive.
 48", 54", 60" Colburn.
 60" Gisholt, motor drive.
 72" King, motor drive.
 72" Niles, Bement, Pond.
 10' Niles.

DRILLS

No. 2 Colburn, 3, 4 Spindle.
 No. 12 Colburn, 1 Spindle.
 No. 314 Baker Heavy Duty.
 No. D-4 Colburn Heavy Duty.
 No. 4-5 spdl. Foote-Burt rail.
 No. 1, No. 3, No. 4 Baush Multiple.
 3' American.
 3' Cinn.-Bickford, motor-on-arm.
 3' Western Plain Radial.
 4' Carlton plain.
 4", 5" American triple purpose.
 5" American Plain.
 6" Western Plain Radial.
 7", 8" Western heavy Radial.

GEAR CUTTERS

No. ½, No. 1 Pfauter Hobber.
 No. 3-26" Brown & Sharpe.
 No. 2, No. 3 Pfauter Hobber.
 No. 2-60" Goss Hobber.
 Nos. 6, 61, 62, 624, 645 Fellows.
 No. 16 HS Gould & Eber. Hobber.
 No. 24 HS Gould & Eber. Hobber.
 18" Gleason Bevel Generator.

GRINDERS

20"x16" Landis Pl. Motor Drive.
 No. 2, 2½ Universal (Bath type).
 No. 4 Landis Universal.
 No. 70 Head Internal.
 No. 16-26" Blanchard vert. surface.
 No. 16-A Blanchard Auto. Vert. Surface.
 No. 5 Springfield Planer Type Surface.

LATHES

16"x6", 8" Lodge & Shipley.
 16" x 7" Lehmann grd. hd., taper. att.
 16"x10" Am. grd. hd., relieving att.
 18"x8" L&S. Grd. Hd., taper att.
 20"x10" Lodge & Shipley Grd. Hd.

NORTON MOTOR DRIVEN GRINDERS

6"x32"	10"x72"	14"x96"
10"x18"	10"-15"gapx72"	16"x50"
10"x24"	10"x96"	16"x72"
10"-15"gapx24"	14"x36"	18"x96"
10"x36"	14"x50"	18"-24"gapx96"
10"x50"	14"x72"	21"x96"
23"x120"	20"x144"	

LATHES—Continued

22"x12" L&S. Grd. Hd. taper att.
 24"x12"; 14'; 16' L&S., grd. hd.
 24"x14", 15" American, Geared Head.
 24" x 22' L. & S., taper att.
 27"x12" American Geared Head.
 30"x11", 15" American, Geared Head.
 30"x12" Lodge & Shipley, taper att.
 36" x 21' American geared head.
 36" x 22" Lodge & Shipley, grd. hd.
 36"x24" Bradford, taper att.
 46"x30' Houston, Stanwood & Gamble, m.d.

MILLERS

No. 1-B, No. 3-B Milwaukee plain.
 No. 3, No. 4 Cincinnati, h.p., plain.
 No. 4-B Brown & Sharpe, plain.
 No. 1-B Milwaukee Universal.
 No. 2 Brown & Sharpe Universal.
 No. 3-B Milwaukee Vertical, m.d.
 No. 5-B, No. 6, No. C-2 Becker Vertical.
 6"x14", 6"x48" Pratt & Whitney Thread.
 No. 4, No. 12 Lees-Bradner Thread.
 No. 5-48" Cincinnati Hydromatic.
 18" & 24" Cincinnati Auto. Duplex.

PLANERS

24"x24"x12" Gray.
 30"x30"x14" Gray, reversing motor dr.
 36" x 30" x 10' Gorton.
 36"x36"x8", 18" Cincinnati.
 36"x36"x14"—24' Cleveland Open Side.
 42"x42"x30" Niles-Bement-Pond, Rev. M.D.
 44"x36"x12" Gray.
 48"x48"x16" Niles-Bement-Pond.
 72"x48"x10" Cincinnati.
 72"x60"x16" American Widened Pattern.

PRESSES

No. 01, No. 1 V&O., O.B.I., M.D.
 No. 1½ V&O., O.B.I., M.D.
 No. 20 Bliss, O.B.I., M.D.
 No. CG-24 Ferracute O.B.I., Geared, M.D.
 No. 3; No. 5 V&O., O.B.I., grd., M.D.

TURRET LATHES

No. 5 Foster Univ., Timken Bearing.
 No. 1-B Foster Universal.
 No. 1-A Warner & Swasey, Motor Drive.
 No. 2A W. & S. A. C. & R. F.
 No. 3A Warner & Swasey, 4¾" H.S.
 No. 4-L Gisholt, cross sliding turret.

HILL-CLARKE MACHINERY CO.
645 W. WASHINGTON BOULEVARD, CHICAGO

15,000 USED STACKING BOXES



ILLUSTRATION
SHOWS
BOXES
STACKED
3 HIGH

\$1.00
EACH

F. O. B. CHICAGO

Excellent Condition

24" x 15" x 7½" - 16 gauge. Olive Green Finish.
Drop Handles Both Ends. Weight 16 lbs.

PASSMAN BROTHERS
705 W. Washington Blvd., Chicago, Ill.

VERTICAL BORING MILLS
16" Bettis; 2 swivel heads; M. D.
54" Bullard New Era Type Vert.
Turret Lathe; Motor Drive.
53" N.-B.-B.; 2 swivel hds.; Power
Rapid Traverse; Motor Drive.
44" N.-B.-P.; 2 swivel hds. Pwr.
Rapid Traverse, Motor Drive.
48" Colburn; 2 swivel hds., S.P.D.

JIG BORER
No. 2 Pratt & Whitney; M. D.

MILLING MACHINES
No. 3 Cincinnati Plain; Belt Dr.
No. 6 Whitney Hand.
No. 25 Becker Plain; Belt Drive.
No. 4 Brown & S., Plain; Belt Dr.
No. 33 B. & S. Auto.; Mtr. in Base.

LATHES
30" x 17" Houst. Stan. & G.; B. D.
26" - 48" x 28" McC. Dbl. Sp. B. D.
24" x 18" Springfield; Motor Drive.
20" x 8" Hendey Grd. Hd.; M. D.
18" x 8" National; B. D.
14" x 6" Hendey Grd. Hd.; Taper.
Motor Drive.
14" x 6" Hendey; B. D.

GRINDERS
No. 16 Blanchard Direct Mtr. Dr.
Vert. Surf.; 26" mag. chuck.
No. 33 Abrasive Surf.; Mtr. in Base.
No. 3 Abrasive Surf.; Mtr. in Base.
No. 2 Brown & Sharpe Surface.
No. 24 Gard. Hor. Disc; 53" dia.
No. 14 Gardner Disc; 20" dia.
No. 8 Badger Ball-Bearing Disc.
No. 1 Fraser Univ. Tool & Cutter.

TURRET LATHES
24" Gisholt; 6½" spindle; B. D.
3" x 36" Jones & L.; S. P. D.

AUTOMATIC SCREW MCHS.
1½" Cone 4-Spindle; Motor Dr.
1½"-1½" Cleveland Model "A".

**RADIAL DRILLS AND
DRILL PRESSES**

7" Cincinnati Bickford; M. D.
5" Cincinnati Bickford; M. D.
4" American Triple Purp., M. D.

SUN MACHINERY COMPANY, INC.
36 VAN VECHTEN STREET,

NEWARK, N. J.

"CLEAN TOOLS"

1" x 5" New Britain six spdl. Automatics, (2).
1½" Four spindle Cone Automatics, m.d., (2).
No. 65 Cons. S.S. Tie Rod Presses, flywh., (2).
18"-36" Fay & S. Gap movable bed Lathe.
No. 106 Rivett Universal Grinders, (2).
No. 4 W. & S. universal Tur. Lathe, G.F.H.
No. 0 G. & L. (Fosdick) Bor. Mill, 31/8".
No. 2 A. W. & S. universal Turret Lathe,
geared, high head.
No. 2 B. & S. automatics, (4).
No. 00 B. & S. Turret Formers, (10).
No. 2 B. & S. hand Screw Machines, (9).
No. 4-48" B. & S. automatic Gear Cutter.
No. 5-60" B. & S. automatic Gear Cutter.
22" x 10' Lodge & Shipley Engine Lathe,
T. A., 5 step cone.
No. 12 Barber Colman Gear Hobber.
18H G. & E. Gear Hobber, S. P. D.
3" Holden-Morgan Third. Millers, 75 mm., (6)
No. 6N Amer. Can S.S. Gap Press, 88 tons.
No. 58 Niagara S. S. Press, 85 tons.

LAKE MACHINERY CO.
652 W. LAKE ST., CHICAGO, ILL.

4-spindle Edlund; M. D.
2-spindle Leland Gifford; M. D.
Single spindle Leland G.; M. D.
No. 2 Avery single spindle; M. D.
3" & 4" American; M. D.
No. 2 Avery 4-Spindle; M. D.

MISCELLANEOUS
GEARSHAPER, No. 62 Fellows,
M. D.

GATE SHEAR, No. 3 Long &
Allstaeter; 24" thrt., 96" blade.
GEAR HOBBER, No. 12 Barber
Colman.

HAMMER, 300-lb. Bradley Herve.
PLATE PLANER, 18" Hilles &
Jones, 3½" cap.

KEYSEATER, No. 2 Baker; M. D.
HYDRAULIC RIVETER, 150-ton
Chambersburg; 6" stroke.

ROLLS, Wickes; vertical type; cap.
12" x 1½"; largest roll 23" dia.;
2 smaller rolls 17" dia.

SHAPER, 24" G. & E.; M. D.
SHAPER, 16" G. & E.; B. D.

SLOTTER, 24" Newton; 42" rotary
table; M. D.

SHEAR, Hilles & Jones Threadless.

Reduce operating costs with MILES REBUILT tools.

AUTOMATICS: 3" No. 19 B. & S., 5000 RPM, m.d. 1" Cleveland Model J double end threading, motor drive 1 1/2" Cleveland Model B 1 1/2" Cone 4-spindle 1 1/2" Cone 4-spindle 1 1/2" Cleveland Model M, 4-spdl. 1 1/2" New Britain 6-spindle 1 1/2" Gridley 4-spdl., M. F. m. d. 2" Cleveland Model A 2" Cleveland Model B 2" National Acme 4-spdl., M. B. 2 1/2" No. 56 National Acme 4-sp. 2 1/2" Gridley 4-spdl., M. F. m. d. 3" Cone 6-spindle 4" New Britain 4-spdl. chk. No. 654 New Britain 6-spdl. chk. No. 24 New Britain chucking No. 33 New Britain chucking No. 5A Potter & Johnston chk. No. 6A Potter & Johnston chk. 8" Bullard Multiautomatic, 6-sta. 10" Bullard Continuumatic, m.d. 12" Bullard Multiautomatic, 6-sta. 18" Gisholt Simplimatics 14" Fay chucking

BROACHES

No. 1 Foote Burt vert. surf. h. f. Twin 19 Oilgear dbl. spcl-hy. m.d. No. 1 Lapointe, screw type 2 ton American vertical 10 ton Metalwood vert. hyd. m.d. No. 2 Standard screw type b. p. No. 28 LaPointe hydraulic No. 3 J. N. LaPointe dbl. scw. t. No. 3 Amer. high speed, rk. t. No. 3 Oilgear hydraulic, m. d. No. 4 LaPointe of Hudson, s. ty. **PRESSES:** No. 5-1 Cleveland OBI, 2 1/2" stroke, 2100 lbs. No. 5-1 Con. OBI, 2 1/2" stroke, 5800 lbs. No. 6 Tol. OBI, 2 1/2" stroke, 7000 lbs. No. 6 Bliss Consol. OBI, 3" stroke, 3500 lbs. 71 ton Waterbury Farrel OBI, 4" stroke, 8300 lbs. No. 10-1 Cleve. OBI, 4" stroke, 14,000 lbs. No. 75 Toledo, geared, open back non-inclined, 2 1/2" stroke, 4500 lbs. No. 76 Toledo openback geared, 3" stroke, 7500 lbs.

No. 5A Bliss horning, 3" stroke, 8000 lbs. No. 16 Bliss horning, elev. table, 1 1/2" stroke, 1150 lbs. No. 24A Consolidated horning, adj. bed, 3" stroke, 5800 lbs. No. 254 Cons. h. 3" stroke, 5800 lbs. No. 255 Bliss Cons. horning, adj. extra height, 12" stroke, 6750 lbs. No. CA14 Ferracute, horning, adjustable bed, 1" stroke, 6750 lbs. No. 41 Tol. horning, 1 1/2" stroke, 1900 lbs. No. 41A Tol type, 1" stroke, 2100 lbs. Engine bench presses, 1" and 1 1/2" stroke, 300 lbs. No. 41N V&O notching, 400 ton No. 24K Bliss knuckle joint coining, 600 ton No. 664B Tol. knk. jt. coin, 2" stroke, 40" between uprights, 47,000 lbs. No. P2 Ferracute punch, 1" stroke, 2500 lbs. No. P3 Ferracute punching, 3" stroke, 3600 lbs.

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Fremont op. bck., non-inclinable, 2 1/2" stroke, 4 1/2" crankshaft Waterbury Farrel open back, non-inclined, 1 1/2" stroke, 3 1/2" stroke, 3700 lbs. No. 55 Toledo straight side, dbl. geared, 10" stroke, 14,000 lbs. No. 55 1/2 Toledo straight side, flywheel dr., 5" stroke, 9500 lbs. No. 55 1/2 Toledo straight side, grd., 4" stroke, 13,000 lbs. No. 56 Toledo straight side, Flywheel drive, 5" or 6" stroke, 12,500 lbs. No. 56 1/2 Toledo straight side, grd., 6" stroke, 15,500 lbs. No. 56 1/2 Tol. straight side, 6" stroke, 42" shut ht., 17,000 lbs. No. 56 1/2 Consol. straight side, grd., 7" stroke, 7" crk., 26,100 lbs. No. 57 1/2 Tol. straight side, dbl. grd., 12" stroke, 7" to 8" crankshaft, 29,000 lbs. No. 63 Bliss Cons. grd., 3" stroke, 9,000 lbs. No. 66 Cons 5" strk., 12,500 lbs. No. 74 1/2 Bliss straight side, 6" stroke, 8,500 lbs. No. 7 Rockford straight side, grd., 3 1/2" stroke, 9000 lbs. No. 8-7 Zeh Hahnmann straight side, grd., 2 1/2" stroke, 6,000 lbs. No. 303 Bliss arch frame, grd., 4" stroke, 8,000 lbs. No. DDG54 Ferracute cam drawing, 2" & 5" strokes, 5,400 lbs. No. 1 1/2 Bliss toggle drawing, 5" and 8 1/2" strokes, 9250 lbs. No. 164 (173) Toledo toggle draw., 16" & 9 1/2" strk., 18,500 lbs. No. 4A Bliss horning, 3" stroke, 4,825 lbs.

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Driv.
Plain

Plain

M.D.

10 H.P.
10 H.P.
Plain
5 H.P.
5 H.P.
Plain

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Hand Millers, Kent Owens, Chicago.
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20" Amer., back grd., crank, vise, c/s.
Threading machine, 2" Landis belt drive.
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18⁸ x 8⁸ B. & E., q. c. g., t. a.
20⁸ x 9⁸ Hamilton, q. c. g.
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24⁸ x 12⁸ Schum. Boye q. c. g.
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No. 20,000, tap, att., C. D.

Rockford 14"x6" Eng. Q.C.G.

3 Step C. D. Prod.

LeBlond h. d., 18"x12", c. d.

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6" Outer.

12" Curtis & Curtis.

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No. 1 1/2 Hendey Universal.

No. 1B Brown & S. Plain.

No. 2 Brown & Sharpe Plain.

No. 3 LeBlond Plain.

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W & S 1 1/4", P & W 5/8" (2)

LATHES

24"x12" Boye & Emmons.

20"x8" Lodge & Shipley.

18"x12" Hendey.

16"x10" Sebastian.

16"x8" Cincinnati.

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3" American, Sensitive.
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4 Spindle No. 2B Edlund.
4 Spindle Kokomo, No. 3 M.T.
No. 22½ Foote Burt.

GRINDERS

8"x54" Fitchburg Pl., m.d.
10"x36" Landis Plain (3).
12"x32" No. 2 Landis Univ.
12"x36" Landis Plain.
6"x32" Norton Plain.
6"x30" Norton Self Cont.
No. 6 Bryant Chucking
18" Bealy No. 26 Disc.
18" Badger No. 220 Disc.
No. 16 Blanchard, Floor, M.D.
No. 11 Landis Tool & Cutter.
No. 55, 60 and 65 Heald Cyl.
14" P & W Surface M. D.
No. 2 R. & S. Surface M. D.
Heim, Centerless.

LATHES

14"x6' Cisco t.a., draw-in.
14"x6' Monarch, q.c.g., cone.
16"x8' Greaves K., Q.C.G.
16"x8' Hendry Cone, T.A.
16"x8' Prentice, Grd. Hd.
16"x10' L & S Cone T.A.
16/18"x8' Am., Q.C.G., Cone.

LATHES (Continued)

18"x8' Advance, Q.C.G.
18"x8' Lodge & S. Cone.
19"x8' LeBonde, Cone.
20"x12' Greaves Klusman.
20"x10' Greaves Klusman.
20"x12' New Haven, T.A.
22"x8"x8' Lodge & S., cone.
24"x10' American Cone
24"x12' Putnam Q.C.G., cone.
24"x14' Pond T.A., Cone
24"x19' American L. C. G.
24"x14' L & S. T.A., Cone
27"x18' Lodge & Shipley, M/D
27" Bridgeford Axel Turning
28"x12' Boye & Emmes.
30"x26' Amer. Grd. Hd.
32"x14' Boye & Emmes, Cone.
32"x17' Fifield, triple grd.
32"x22' Schumacher Rose.
42"x18' Pittsburgh, Q.C.G.,
cone
42"x20' L. & S. Cone, Q.C.G.
42"x30' Johnson Grd. Hd. M.D.
48"x36' Fifield, m.d.
60"x25' Gleason hvy. duty.

MILLERS

18" Cinci. Duplex 24" table
18" Cinci. Duplex 16" table
No. 2 Cincinnati Pl., Cone.
No. 3 Cinci. Hi Power M.D.
No. 3 Cinci. Hi Power Pl. P.R.T.
No. 4 LeBlond Pl. Cone, M.D.
Nos. 5, 5C, 6 & 8 Beck, Vert.
Model C Becker Vert. S.P.D.
Model CS Becker Continuous.
No. 3 LeBlond Univ., Cone.
24"x24"x12' Ingersoll Adj.
Rail Planer Type.

PLANERS

72"x72"x18" D&H Openside.
60"x60"x18" D & H Openside.
48"x48"x12" D&H Openside.
48"x36"x10" Gray, 2 Hds.
42"x36"x20" Cinci., 3 hds.
30"x30"x9" Powell, 2 Hds.
24"x30"x6" Cinci., 2 Hds.
36" Newton Rotary, M.D.
30"x30"x10" D & H Openside.
30"x30"x8" Powell 2 hds.
27"x27"x8" W & P, 1 hd.
24"x8" Gray; 24"x7" Niles.
24" Lynd Farquhar Openside.

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TURRET LATHES (Continued)

No. 5 Foster, 1-13/16" bar.
21" Gish. 31" H.S., 2 cone
24" Gish., 61" H.S., A.C., M.D.
24" Gish., 61" h.s., 2 cone.
28" Gisholt M.D.
24"x24" & 3"x36" J. & L.
No. 2A Warner & Swasey Univ.

MISCELLANEOUS

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Billet Breaking Mach., Ajax.
Bolt Threader, 14" Landis.
Bolt Threader, 2" Landis.
Broach, No. 3B LaPte. M/D.
Chuckings, Nos. 34 & 23 N. B.
Flanger, ½" McCabe Pneu.
Gear Cutter, 110" Newton Spur
Gear Planer, 24" Gleason.
Gear Hobber, 6" Pfauter.
Gear Shaper, No. 61 Fellows.
Gear Generator, 11" Gleason.
Header, 1½" Acme Rivet.
Header, 2" Acme, Steel.
Keystrs., No. 1 Bak, No. 1 Dav.
Keyseat., Nos. 2, 3 & 4 M&M
Nibbler, No. 3 Gray 8" 36".
Pipe Mach., 4" Landis, M.D.
Pipe Machine, 8" Williams.
Pipe Machine, 12" Saunders.
Pipe Mach., 12" Curtis & C.
Pipe Mach., 2" Bignal Keebler.
Press, No. 8½ Z & H Percussion
Press, No. 61 Spec. V & O.
Press, No. 74 Bliss Consolidat.
Punch & Shear No. 47 PBC B.
Punch 54" H & J No. 2 D.E.
Punch, 36" Whit. 4½x5".
Rolls, 8"x8" H&J No. 2.
Rolls, 14"x11" Wickes.
Rolls, 16½%" H & J No. 5.
Rolls, 20"x%" H & J No. 6.
Saw, 9"x10" Peer. Hack, M/D.
Saw, 6" Avey Milband.
Saw, 6" Gorton No. 2B Inter.
Saw, 12"x15" Racine M.D.
Shaper, 16" American, Cone.
Shaper, 24" Gould & Eberhardt
Shapers, 24" & 20" Queen
City M.D.
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Shear, 30" Cleveland, No. X.
Shear, 156"x11" United, 36" x
126"x11" Amer., 22" Gap.
126"x11" Niagara, 18" gap.
Slotter 15"-18" Drill.
Slotter, 24" Newton, M/D

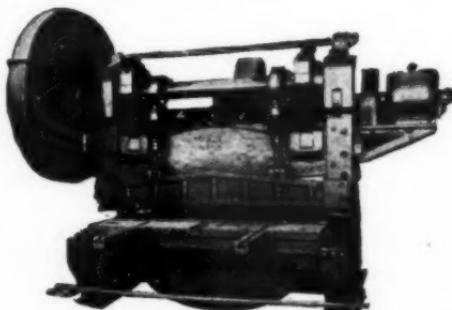
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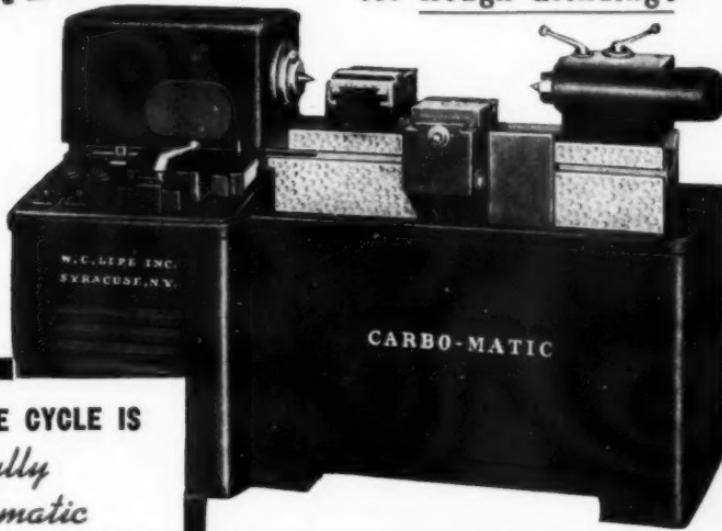


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